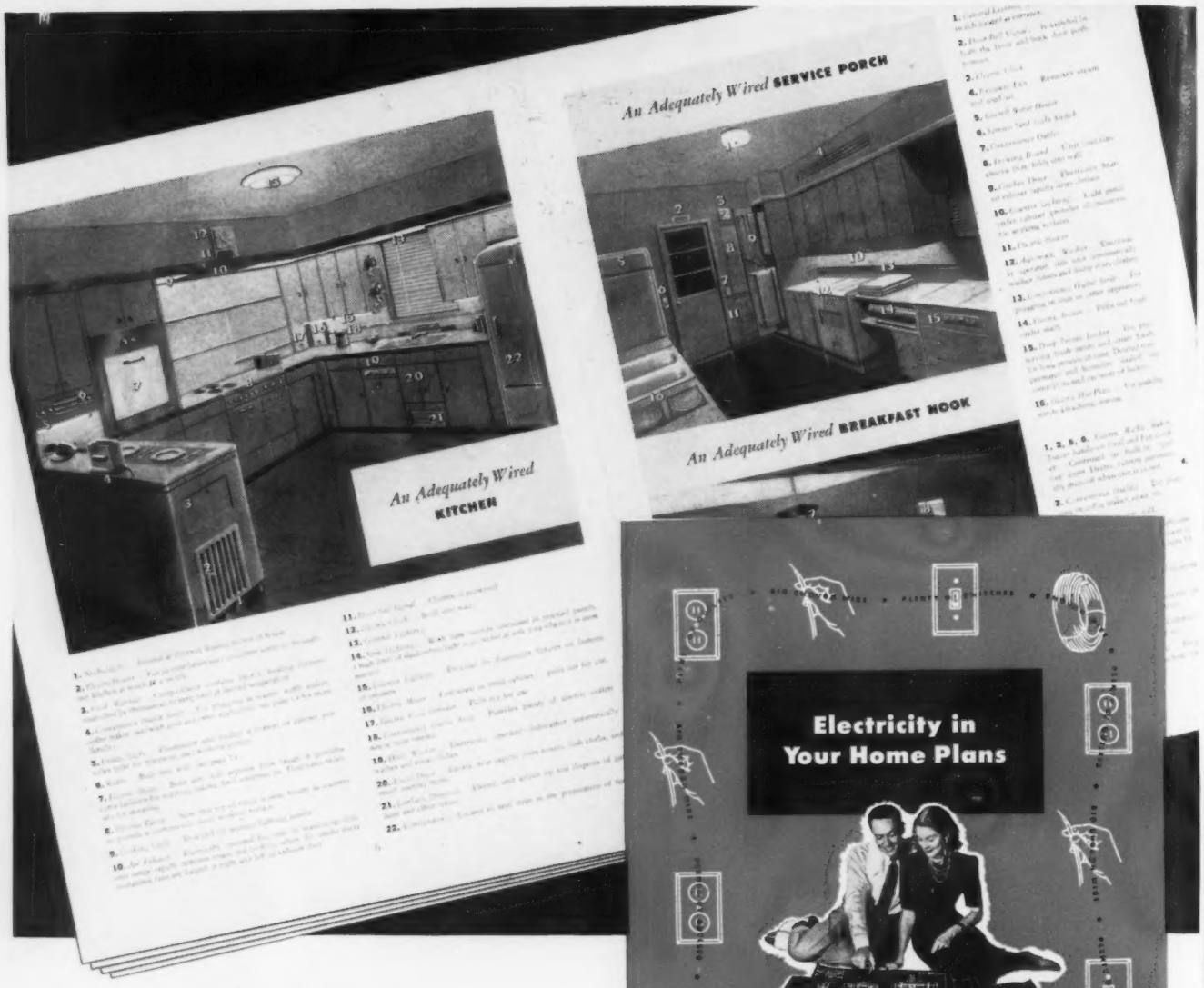
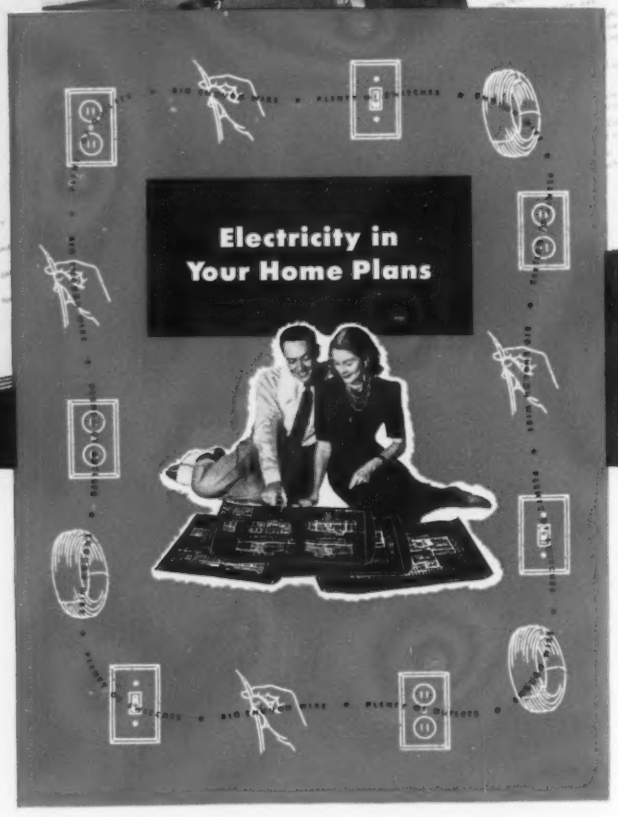
ne, 1944 TWELFTH ANNUAL CONVENTION-IN-PRINT 50¢ a Copy

# ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

BUY ONE OF THESE BONDS TODAY!




# Just Published

The Edison Company recently published this new illustrated book on the subject of proper wiring and its importance in the modern home. Containing many useful electrical ideas for adding greater convenience, comfort and beauty to the home, the book is distributed free of charge to architects, building contractors and home-planners.

Promoting a wider knowledge of adequate wiring and emphasizing that it is indispensable to the full use of electrical appliances and services, this book is helping to lay the groundwork for postwar selling. The Edison Company invites contractors and dealers to send for a free copy of the book.

**SOUTHERN CALIFORNIA EDISON COMPANY LTD.**

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), June, 1944. Vol. 92, No. 6. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold. Single copy 25c. Copyright, 1944. McGraw-Hill Company of California.

# 3 GOOD REASONS

WHY YOU SHOULD USE

## Novalux

SERIES SOCKETS

**1. RADIO INTERFERENCE and ARCING PREVENTED**

by sturdy one-piece construction of current-carrying parts.

**2. GOOD FIT IN ALL LUMINAIRES**

obtained by carefully designed prong shape.

These sturdy, high-quality series sockets will save time and money on maintenance—and, equally important, they will prevent many service outages. They easily withstand the temperature changes, vibration, and atmospheric corrosion that have often caused street-lighting sockets to fail. Of course, they are standard equipment for G-E Novalux luminaires—but regardless of what make of luminaire you are using, you can use Novalux sockets as replacements.

For further information, address the nearest G-E office or agent. *General Electric Company, Schenectady 5, N. Y.*

*Novalux Renewal Parts* catalog, complete, well-illustrated, facilitates checking stock and ordering parts. Write for a copy of GEA-4084.

**3. LOW-COST REPLACEABLE SHELL**

either porcelain or Textolite, saves money and metal.

### High-quality, Low-cost Cutouts

Good series sockets deserve good cutouts. G-E Novalux copper-oxide film cutouts are good because (1) their carefully controlled dielectric value is not affected by heat or pressure, and (2) a moistureproof, metal-and-fiber casing prevents damage to the dielectric film.

**BUY WAR BONDS**

**GENERAL ELECTRIC**

Novalux RENEWAL PARTS for Luminaires

# Here in the WEST

## People

**John D. Enefer**

who writes of population and load forecasting, p. 82, was born in Ontario, Canada, moved as a child to Detroit, then to Los Angeles. He went to work for PG and E at Oakland in 1916 and the next year returned to Los Angeles to join Southern California Edison. He has served that company continuously since, in operating jobs, both hydro and steam plant, the dispatcher's office and numerous substations, becoming a division superintendent. He joined the general engineering division in 1938 and since has been engaged in general system planning and engineering economic studies. During the war he has been connected with the Pacific Southwest power interchange committee and spent some eight months in Washington, D. C. assisting the OWU power supply division.

**Charles Grunsky**

tells of Coast Counties' employee training program, p. 75. After being graduated in electrical engineering from U. C. and service with the Army, he joined the staff of the California Railroad Commission. He resigned as assistant engineer of the Gas and Electric department in 1929 to accept the post of rate engineer of Coast Counties Gas & Electric Co., later to become chief engineer, the position he now holds.

**D. J. McGonigle**

is general sales manager of Montana Power Co., at Butte. Making a thorough analysis of postwar possibilities, he recently toured factories and laboratories of major manufacturers and his observations are on p. 87.

**R. L. Dearborn**

of Kaiser Co. engineering staff, has done much original work in illumination and lighting design, and has compiled data for a future manual on lighting design (p. 91).

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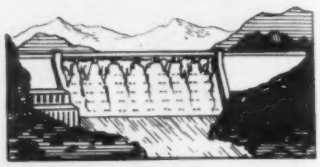
Cover: United States Marine Corp Photo.

## Preview

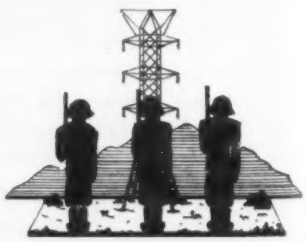
**Shasta**



has many aspects in respect to the future of the West — Shasta dam and power plant, not the mountain from whose perpetual snows comes the water to make the wheels turn. The political and economic aspects may be argued long and heatedly and editorials may be written about these phases from time to time. But next month the electrical and power phases, the engineering and construction alone, about which there can be no argument, will be told in important detail in this magazine. One of the truly big jobs in this region of big works, Shasta dam and power plant has excited interest through the years of its building. Soon to go into operation, it will deliver the first power developed from the Central Valley water project. Its originally ordered generators borrowed by Grand Coulee, the power plant now has two of its eventual four units installed and making test runs during this month.

**Employment**

will be the No. 1 postwar goal of all industry. An analysis of postwar employment possibilities in the electrical industry, based on a study being made by the planning committee of the Pacific Coast Electrical Assn. will be published in the July issue.



**Appliance Ethics**

Selling policies and ethics in the "good old days" were not always good but a busy industry had little time to think what might be done about them. The planning committee of San Diego's enterprising Bureau of Radio and Electric Appliances has just made such a study and its penetrating recommendations will be found in the next issue.

# "On Location"

## FOR NEW POSTWAR LOADS... IN ONE UNIT!

### Quick, low-cost reconversion... with Westinghouse CSP Distribution Transformers

Going "on location" to new postwar load centers is greatly simplified with Westinghouse CSP (Completely Self Protecting) Distribution Transformers. There is no time-consuming, costly disassembly and reassembly of nine or so pieces of conventional equipment.

Every part of the CSP transformer is built-in. To move it, all that needs to be done is: disconnect . . . take to new location . . . mount . . . reconnect. Tomorrow's unpredictable loads can be handled with minimum investment in time and money.

Many CSP transformers can be moved in the time ordinarily required for a few conventional installations.

Westinghouse CSP Distribution Transformers offer maximum *load adaptability* for better service continuity. A signal light warns of an overload before the internal breaker trips. *All* the thermal overload capacity is made *safely* available for short-time overloads.

For complete information, call your Westinghouse office or write for DD-46-100, Westinghouse Electric & Manufacturing Company, Dept. 7-N, East Pittsburgh, Pa. J-70428

**WESTINGHOUSE CSP DISTRIBUTION TRANSFORMERS CONTAIN:**

- transformer
- "De-ion" arrester
- circuit breaker for overload and short circuit protection
- grounding gap
- current limiting resistor

WESTINGHOUSE

Westinghouse

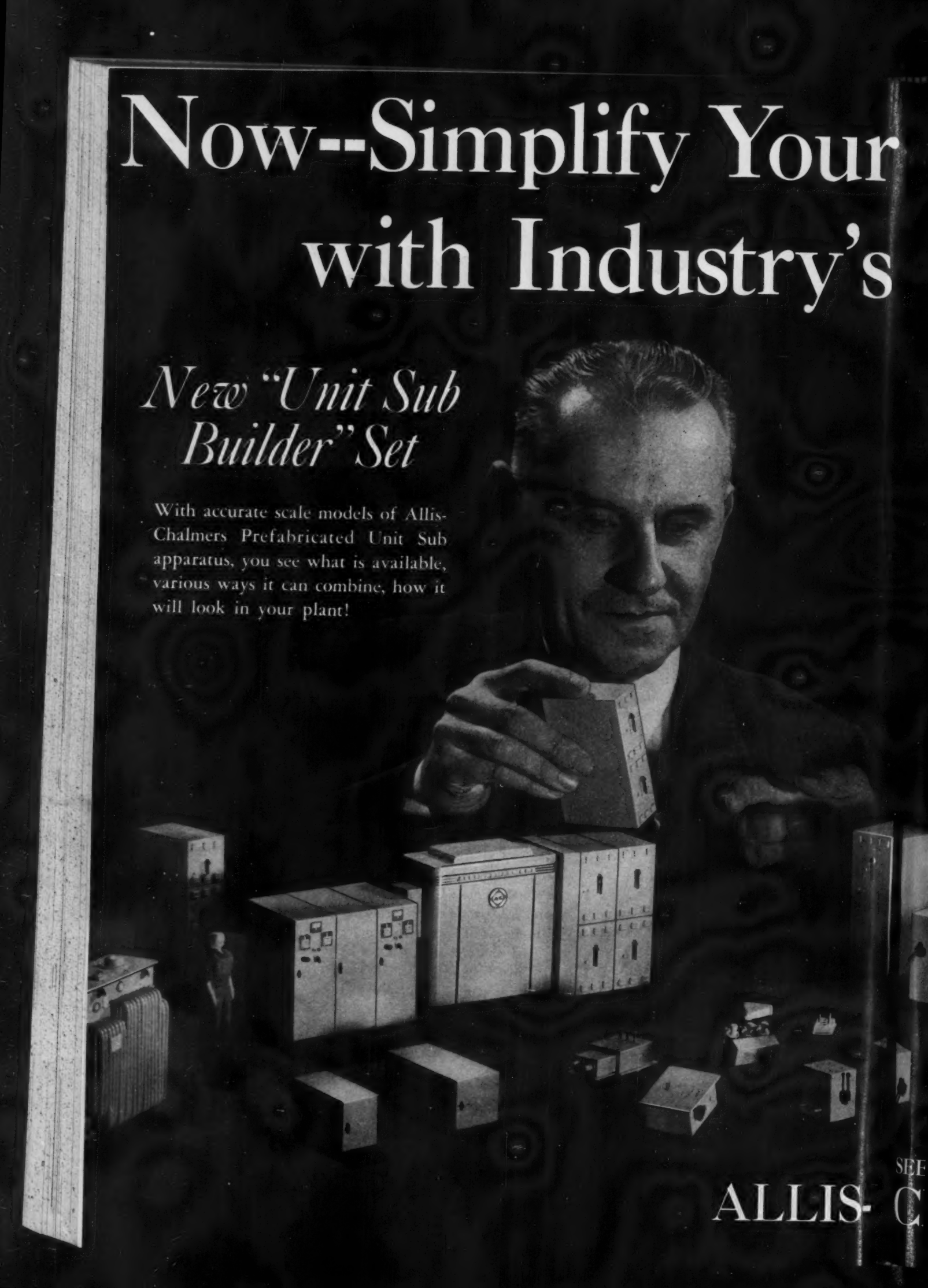
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

PACKAGED POWER

# Now--Simplify Your with Industry's

## *New "Unit Sub Builder" Set*

With accurate scale models of Allis-Chalmers Prefabricated Unit Sub apparatus, you see what is available, various ways it can combine, how it will look in your plant!



SEE

ALLIS- C

# Unit Sub Planning Newest Aid!

GUESSWORK IS GONE from unit sub planning when you *see* the elements of Allis-Chalmers Prefabricated Unit Substations — in accurate scale models.

You plan *visually*, effortlessly — without bogging down in charts, tables, diagrams — save time, cut way down on any chance of error.

To see for yourself how the new "Unit Sub Builder" Set can help you in your power distribution planning, call your nearby Allis-Chalmers district office.

An A-C field engineer will bring the models, together with the handy new "Unit Sub Slide Rule" for calculating breaker capacity — and new "Check List" for *double* checking all details. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

• • •

♪ *Tune in the famous Boston "Pops", Blue Network, Saturdays at 8:30 pm, EWT.*

A 1746

SEE YOUR UNIT SUB IDEAS WORKED OUT WITH

ALLIS-CHALMERS *"Unit Sub Builder" Set*

# PLUG IN ANYWHERE ALONG THE LINE —WITH BULLDOG BUSTRIBUTION DUCT

This photo shows BullDog Bus Duct used on welder circuits. Note the short cable runs from overhead Plugs.

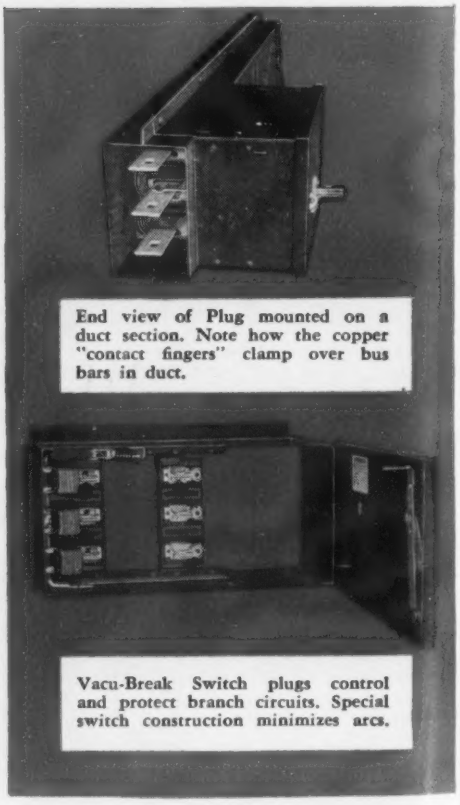
When you install Bus Duct, you wipe out a great many of your electrical power problems.

You can add new machines at will or move old ones to any location because ten plug-in openings are available in each standard 10-foot section of safely-enclosed duct casing.

This gives your workers a constant flexible source of power that is safe . . . convenient . . . clean . . . efficient.

Also, Bus Duct can be easily and quickly installed. Any plant electrician with a couple of helpers can put it up. And it is 100% salvable.

Those plants which have Bus Duct will be a long step ahead in reconverting to peace production. Our field engineers will be happy to help you with *your* power problems. Write today for complete descriptive Bulletin No. 427.



End view of Plug mounted on a duct section. Note how the copper "contact fingers" clamp over bus bars in duct.

Vacu-Break Switch plugs control and protect branch circuits. Special switch construction minimizes arcs.

*Buy More War Bonds*
*Get In Your Scrap*

**BULLDOG**
**ELECTRIC PRODUCTS CO.**

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DETROIT 32, MICHIGAN
BullDog Electric Products of Canada, Ltd., Toronto, Ont.

Field Engineering Offices in All Principal Cities

**ALSO MANUFACTURERS OF**

VACU-BREAK SAFETY SWITCHES • SAFTOFUSE PANELBOARDS • SWITCHBOARDS • CIRCUIT MASTER BREAKERS • UNIVERSAL TROL-E-DUCT, *for flexible lighting* • INDUSTRIAL TROL-E-DUCT, *for movable "loads."*

**BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:**

**Coast Electric & Manufacturing Co.**
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**Safety Switchboard & Manufacturing Co.**
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

**Mullenbach Electrical Manufacturing Co.**
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

# Kelvinator Breaks National Magazine Campaign to Help Dealers & Service Men during Critical Summer Months

### Promotes User Cooperation on Service When It is Needed Most!

Tying in with the nationwide "Better Care—Less Repair" activity, Kelvinator's Summer Service Program is aimed to show consumers how to keep their refrigerators and ranges at peak efficiency for the duration . . . to help cut down needless service calls . . . to gain "good will" for the Kelvinator dealer by obtaining customer understanding and cooperation when delays in handling service calls are unavoidable. It is a program to help the dealer—by helping his customers.

### Two Wartime User's Guides

Kelvinator's Wartime User's Guides for refrigerators and electric ranges tell customers how to diagnose and report trouble accurately, so needless service calls will be unnecessary. These booklets are designed to help the owner and build good will for Kelvinator dealers. Available, *free*, to all Kelvinator dealers.

### *Magazine Advertising Has Combined Circulation of over 16,000,000*

Appearing at the beginning of the service rush season, attention-getting, colorful ads will appear in magazines that reach 16,000,000 readers. Among these readers are your pre-war customers . . . and your post-war prospects. Striking illustrations dramatize the need for customer cooperation in helping dealers render efficient service. And the new Kelvinator User's Guides are offered in each ad. See this advertising in the *Saturday Evening Post*, *McCall's*, *Better Homes and Gardens*, *Good Housekeeping*, *Household and True Story*.

### Special Dealer Helps Available

A complete set of human interest double and single column newspaper mats are available for dealer's use in telling the Kelvinator Service story locally. There are also one-minute spot radio announcements, friendly letters for mailing to customers and a handy *Telephone Conversation Guide* to assist you in handling service telephone calls efficiently.

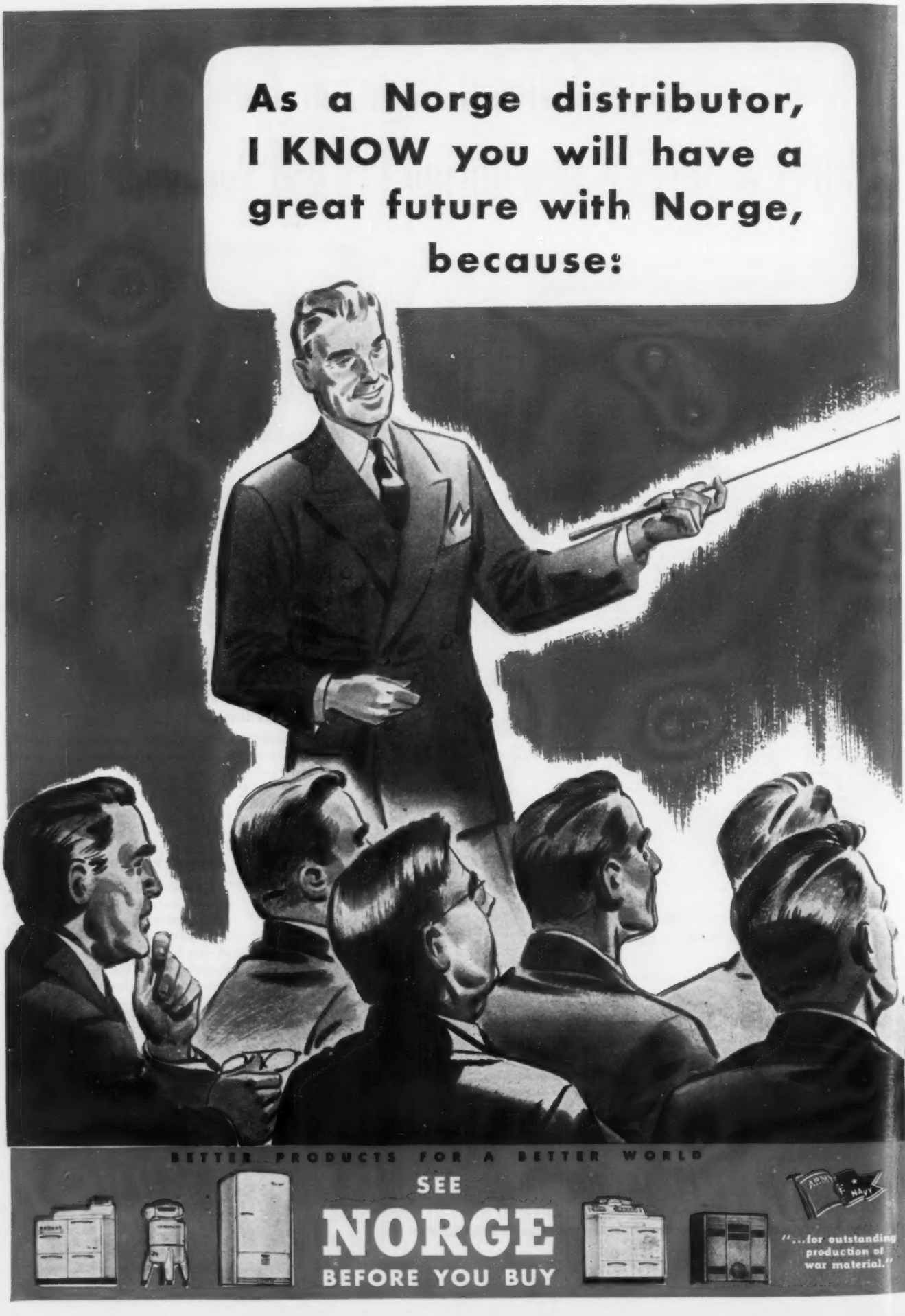
### Service Program Plan Book

The entire Kelvinator Service Program is completely outlined in this aptly named Plan Book, "Keeping Friends through Wartime Service." If you haven't received your free copy, contact your nearest Kelvinator Zone or distributor.

BETTER CARE — LESS REPAIR

The men and women of the Propeller Division of Nash-Kelvinator Corporation have been awarded, and proudly fly and wear, the famous Army-Navy "E" for High Achievement in War Production.

LOOK AHEAD WITH KELVINATOR
DIVISION OF NASH-KELVINATOR CORPORATION
Kenosha · Milwaukee · DETROIT · Grand Rapids · Lansing


As a Norge distributor, I KNOW you will have a great future with Norge, because:
BETTER PRODUCTS FOR A BETTER WORLD
SEE
NORGE
BEFORE YOU BUY
ARMY
NAVY
"...for outstanding production of war material."

**1 NORGE OFFERS ALL MAJOR APPLIANCES UNDER ONE BRAND NAME**— Norge refrigerators, gas ranges, washers, electric ranges and home heaters comprise a well-diversified line with which to capture multiple sales from each customer.

**2 NORGE IS THE CHAMPION OF INDEPENDENT DISTRIBUTION**— Norge was first to formally announce a postwar policy of independent distribution. Norge's past has been tied up with independent distribution. The factory will not compete with its dealers.

**3 THE NORGE LINE IS PROFITABLE**— Fair pricing and minimum selling costs because of wide public acceptance assure good profits to Norge dealers. Combination sales to the same customer provide opportunities for "plus profits." Mixed shipments keep freight charges down.

**4 EVERY NORGE PRODUCT HAS EXCLUSIVE FEATURES** — Each Norge product is strong on eye-appeal—and is backed by exclusive features—buyable differences—of convenience and efficiency. Norge mechanisms are noted for long, trouble-free service.

**5 NORGE OFFERS PRODUCTS OF EXPERIENCE**— Many years of designing, changing, home testing and improving have resulted in true *products of experience.* Norge's appliance know-how is your protection.

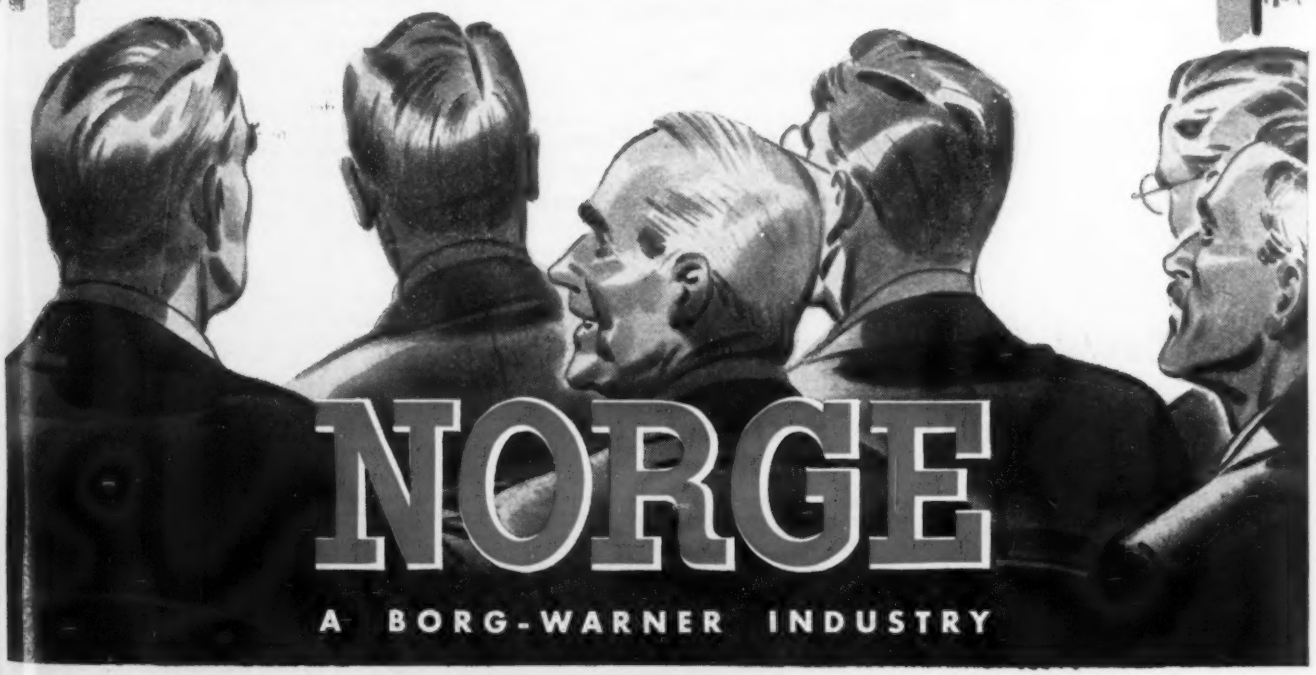
**6 NORGE PRODUCTS HAVE GOOD WARTIME RECORD** — Sturdy construction of working parts, plus the convenience of nation-wide major service centers, has won the praise of dealer and owner during the "non-replacement" years.

**7 NORGE HAS DEVELOPED MANY "FIRSTS"** — Many engineering developments originated by Norge have subsequently become standard in the industry—resulting in prestige which greatly helps the sale of all Norge products.

**8 NORGE ADVERTISING IS PRE-SELLING PROSPECTS** — Aggressive and consistent national magazine advertising is a well-known Norge policy. Local advertising on a generous cooperative basis is offered to the dealer.

**9 NORGE PERSONNEL IS EXPERIENCED**— A large percentage of Norge factory men and distributors have been on the job for ten years and more. This means that a well-seasoned personnel works with and gives friendly counsel to the Norge dealer.

NORGE DIVISION, BORG-WARNER CORPORATION, 670 EAST WOODBRIDGE ST., DETROIT 26, MICHIGAN



OUR NAME MAYDWELL SPELLS QUALITY

MAYDWELL & HARTZELL
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TRANSMISSION AND
DISTRIBUTION EQUIPMENT

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Gardner Transformers
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at Three Points on Pacific Coast:

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HEmlock 1630

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455 Colyton St.
MUtual 7245

SEATTLE, 4
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ELiot 5007

# BOOKS
## *you may want*

MODERN TURBINES, by Louis E. Newman, Allen Keller, John M. Lyons and Lawrence B. Wales, 178 pages, 5½ x 8⅜; John Wiley and Sons, $2.75.

This is an excellent book and will be exceedingly useful to students of mechanical engineering and engineers having to do with the design and operation of steam turbine plants. The Germans have, for years, gotten out books of this sort, but this book by Newman et al appears to be the only one in English.

The book is primarily concerned with estimating the performance of the various types of steam turbines, condensing and non-condensing, single and double extracting, and mixed flow units.

The various types of governor gears are described and illustrated. There is a chapter on the fundamentals of electric generators, including a discussion of generator field current, stability, reactances and time constants.

The book is clearly written and tables, charts and illustrations are plentifully used in explaining the methods for estimating performance, including the effects of changed steam conditions.—R.C.P.

PRACTICAL RADIO AND ELECTRONICS COURSE, by M. N. Bietman, 3 vols., vol. 1, 171 pages, vol. 2, 96 pages, vol. 3, 97 pages, 8½ x 11, paper covers, Supreme Publications, Chicago, Ill., set $3.95. A non-mathematical introduction to the field of electronics is presented as a home study course divided into 53 lessons and three volumes.

Volume 1 (13 lessons) deals with radio electronic fundamentals and consists of a series of pictures and charts on each subject, with detailed captions stressing identification of components, and circuit diagram reading. Calculations of a-c and d-c circuits are done, for the most part, by charts.

Vol. 2 is entitled *Receivers, Transmitters, and Test Equipment* and consists of eight lessons describing the action of various types of receivers, and a simple two-stage transmitter, as well as the use of common test equipment.

Vol. 3 deals with *Applied Electronics and Radio Servicing*. Short non-technical descriptions of photo cells, welding controls, x-ray, motor control, direction finders, altimeters, etc. are included. Elementary procedures for servicing receivers complete the course. —K.M.N.

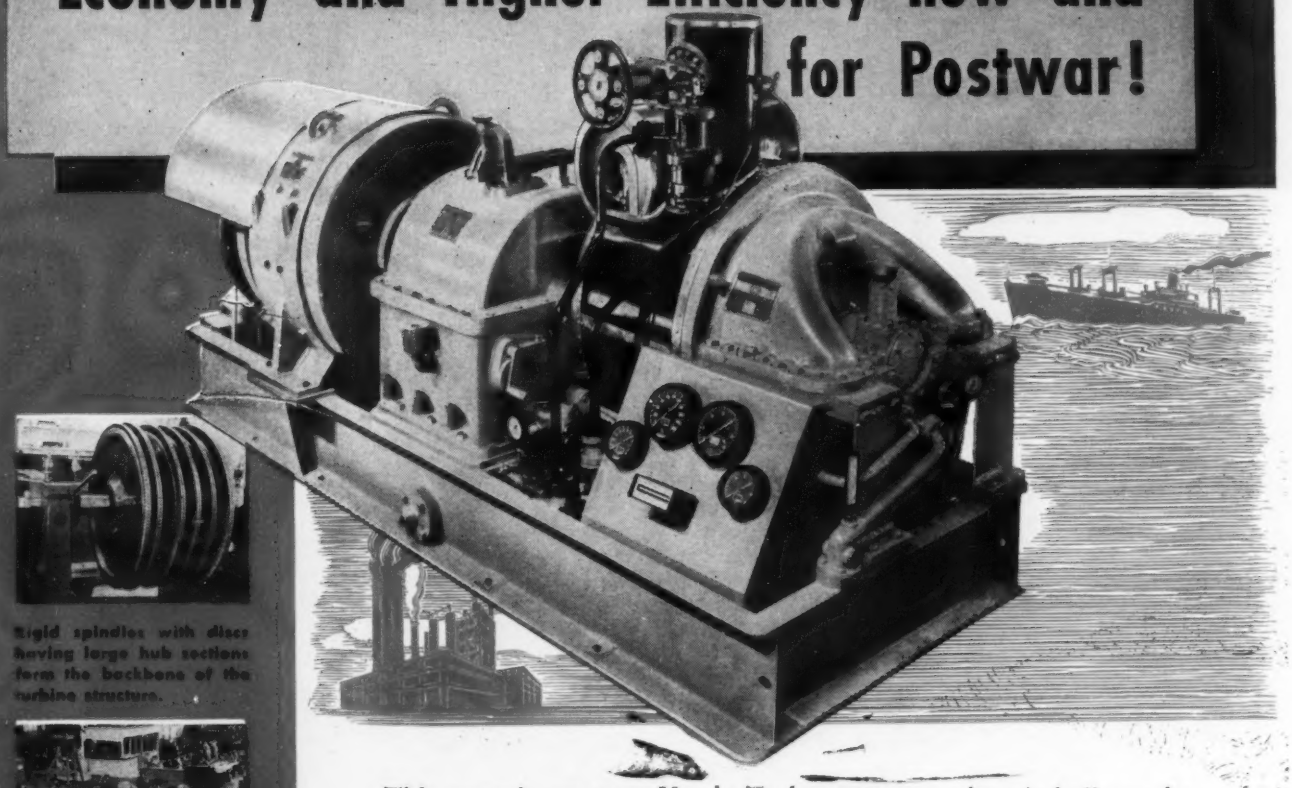
RADIO RECEIVER DESIGN (Part 1), by K. P. Sturley, Ph.D., 435 pages, including index and appendix, 6 x 8½, 161 figures, John Wiley & Sons, N. Y., $4.50. The author's aim in these books is to bring together the fundamentals of radio receiver design presented in the order of signal progression in the receiver.

Part I deals with tubes, antennas and antenna coupling circuits, radio frequency amplification, frequency changing, oscillators for superheterodyne receivers, intermediate frequency amplification and detection.

Part II of this book will take up radio frequency amplifiers, power supplies, receiv-

(Continued on Page 20)

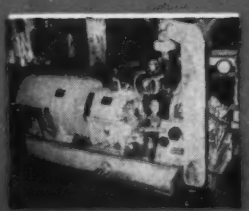
# HENDY'S NEW TURBO-GENERATOR Assures Economy and Higher Efficiency now and for Postwar!





Rigid spindles with discs having large hub sections form the backbone of the turbine structure.

Production-line assembly of Hendy turbines is possible, through the application of exacting dimensional-control systems.



A portion of the extensive testing stands where exhaustive tests are given each Hendy Turbo-generating plant before it is marked "OK for shipment."

This smooth, compact Hendy Turbo-generator plant is built to the rigorous requirements of war service. Proving its economy of operation and higher efficiency under today's exacting demands, it will be ready to serve in many marine and industrial uses of the postwar era.

Among the features that distinguish this new Hendy power plant are:

1. Fabricated steel reduction gear case encloses the oil pump, priming pump, governor and its power unit, and the high-speed pinion coupling.
2. New-type, simplified governing mechanism requiring no stuffing boxes or soft packing, insures closer speed regulation and uniform output.
3. Parts subject to normal wear or periodic inspection are designed for maximum accessibility to reduce time required for servicing.
4. Location of filters, strainers, coolers and controls eliminates much piping and increases over-all efficiency.

Hendy Turbo-generators can be built to your exacting requirements in a range of 250 to 750 kw. Larger ratings are being designed. Your inquiries are invited.

## JOSHUA HENDY Division

### JOSHUA HENDY IRON WORKS

SUNNYVALE, CALIFORNIA

EST. 1850

BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • ST. LOUIS • WASHINGTON • LOS ANGELES

TURBO-GENERATORS

REDUCTION GEARS

STEAM TURBINES

DIESEL ENGINES

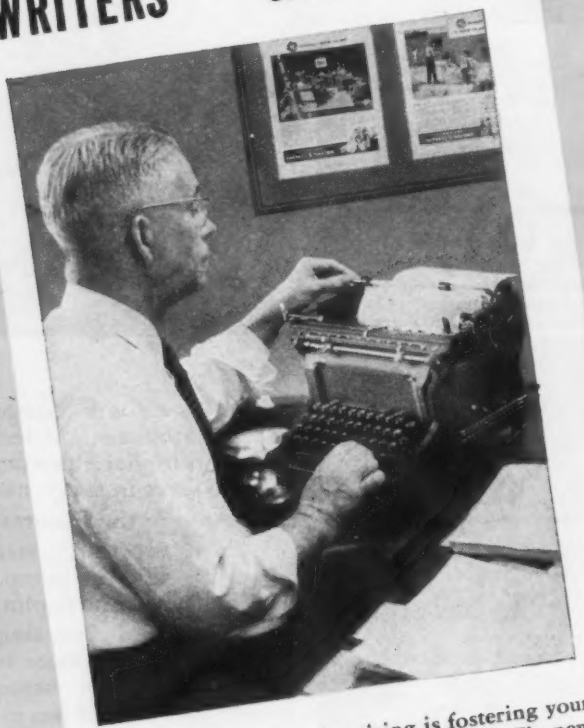
# Their job* is to help lift

**General Electric is paying them. But they're working for you as well . . . to bring the benefits of the new techniques of modern lighting to your customers and to you, and to help create thousands of desirable and useful jobs in the lighting industry.**

## DESIGNERS . . . To Pioneer Higher Standards

Higher standards of lighting have to be stimulated before they can be sold. How? Ten architects and designers of nation-wide reputation have been commissioned by G-E to work out creative ideas for better store, home and office lighting.

## WRITERS . . . To Let Your Customers Know



Extensive G-E Lamp advertising is fostering your customers' desire for better lighting. G-E's new advertising campaign, "G-E Research is Moving the Sun," has set a new high in reader interest and uncovered strong demand for modern lighting.

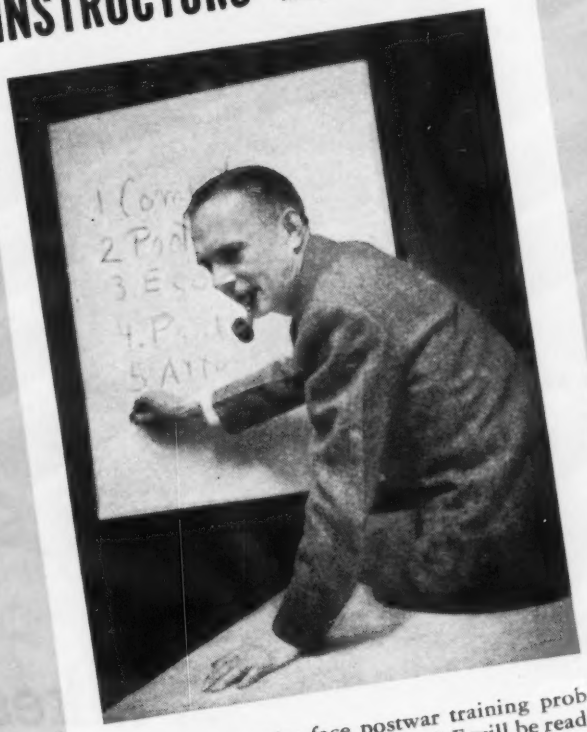
*Each of these four men represents not just one man, but a whole group. Subject to prior claims upon their time from wartime jobs, they are at work to help make lighting your No. 1 immediate postwar load builder.*

GENERAL ELECTRIC

*Hear the General Electric radio programs: "The G-E All-Girl Orchestra", Sunday 10 p.m. EWT, NBC; "The World Today" news, every weekday 6:45 p.m. EWT, CBS.*

# postwar lighting standards

## INSTRUCTORS . . . Lighting Needs Men To Sell It



Lighting companies face postwar training problems of unprecedented difficulty. G-E will be ready with a complete program to help you give your employees the training and equipment you want them to have . . . and they will be eager to get.

## RESEARCHERS . . Progress Depends on Knowledge

Longer, slimmer fluorescent lamps, circular F lamps, and instant-starting F lamps are just a few of the new lighting tools, developed by G-E research scientists, which will be available as soon as the more urgent task of winning the war permits

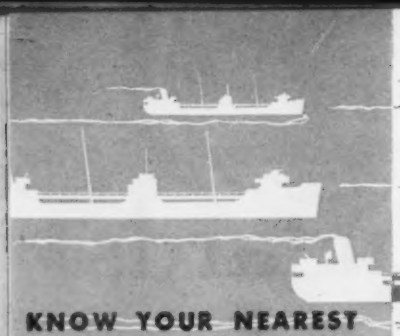
**Architects and designers, writers and artists, teachers and training schools, lamp research men and engineers . . . all are being united by G-E in one broad program to help you, the men you will employ, and your customers to get the most out of postwar lighting. G-E appreciates the contributions of many lighting companies to the development of this program. General Electric Lamp Department, Nela Park, Cleveland, Ohio.**

***"TO MAKE G-E LAMPS STAY BRIGHTER LONGER"***

*The Constant Aim of G-E LAMP RESEARCH*

**G-E MAZDA LAMPS**

KEEP BUYING WAR BONDS—KEEP THE WAR BONDS YOU BUY



## KNOW YOUR NEAREST BLAW-KNOX DISTRIBUTOR

**ALABAMA**
Birmingham—McConnell Sales & Engineering Corp

**CALIFORNIA**
Los Angeles—E. M. Ornitz
San Francisco—W. S. Wetenhall Co.

**COLORADO**
Denver—Mine & Smelter Supply Co.

**DISTRICT OF COLUMBIA**
Washington—Meloney Engineering Co.

**GEORGIA**
Atlanta—Evans L. Shuff

**INDIANA**
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South Bend—Edwards Iron Works, Inc.

**IOWA**
Des Moines—Delevan Engineering Co.

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New Orleans—Arthur C. Hays

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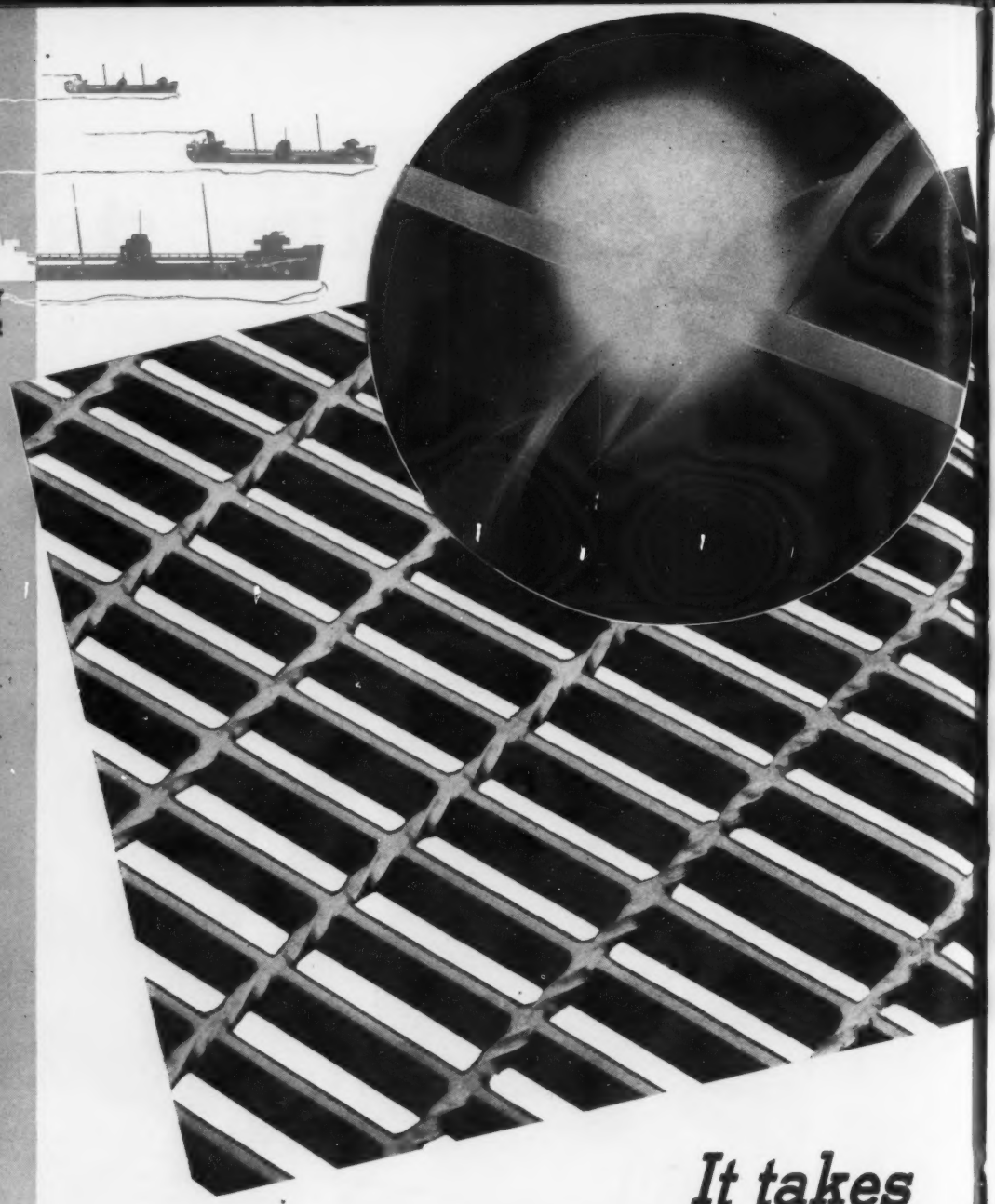

# *It takes* ELECTROFORGING *to make a real catwalk*

A pitching ship and a greasy boot have accounted for many a casualty at sea. So, for the utmost in safety specify the TWISTED BAR of Blaw-Knox grating on catwalks and all open flooring.

- ★ One-piece electroforged steel construction for maximum strength!
- ★ Easy maintenance — paint reaches entire surface!
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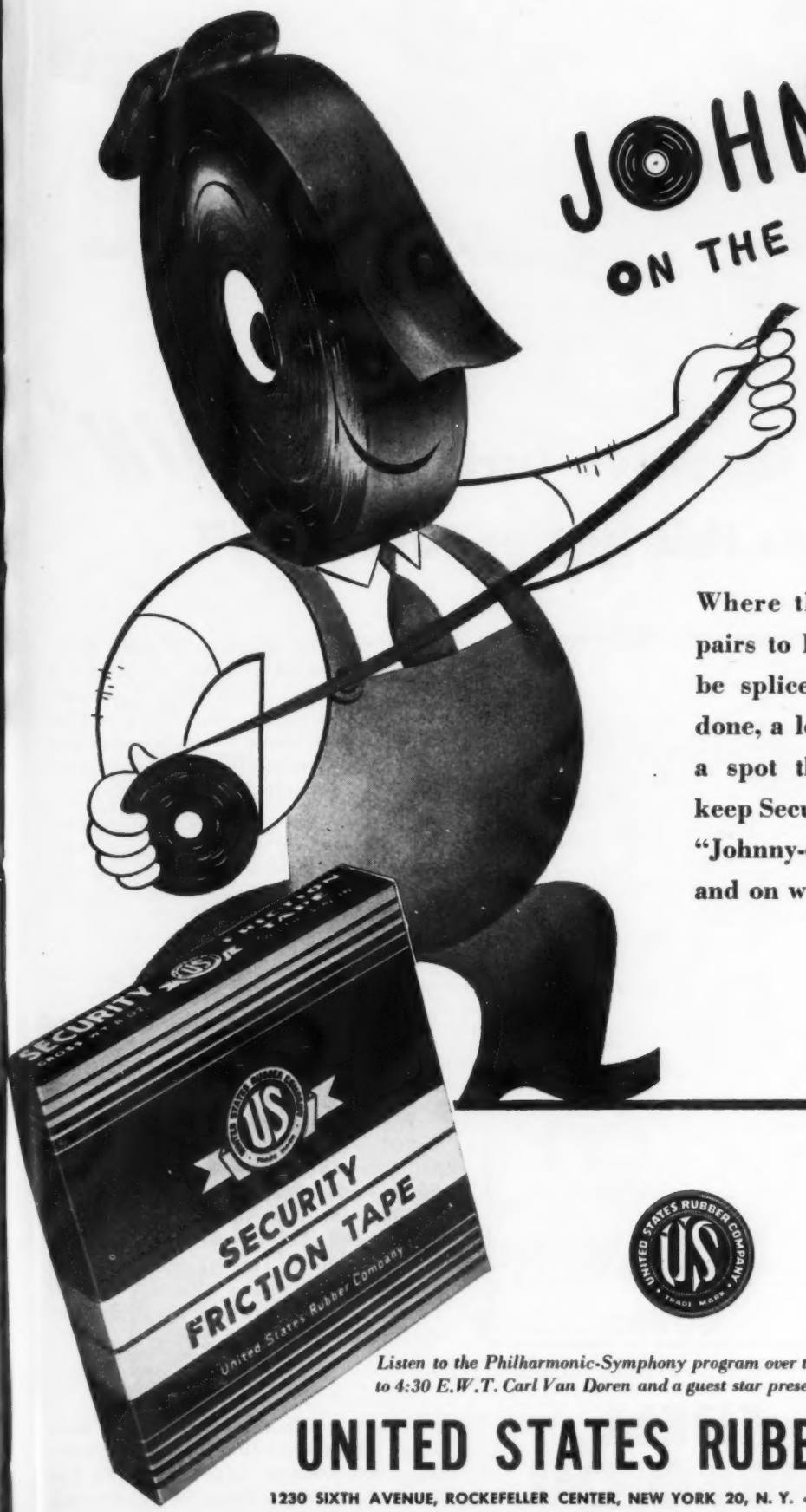
- ★ Self-cleaning — no sharp corners to clog with dirt!
- ★ Economical and easy to install — cut to fit your specifications!

**BLAW-KNOX DIVISION** of Blaw-Knox Co.
2093 Farmers Bank Bldg., Pittsburgh, Pa
OFFICES IN PRINCIPAL CITIES

# BLAW-KNOX STEEL GRATING

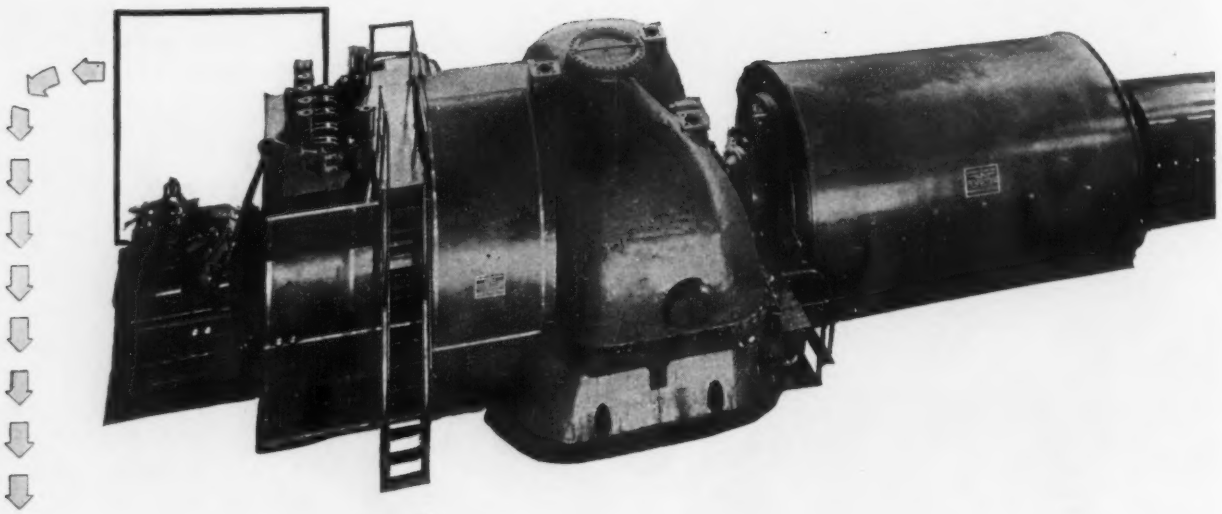



**Where there are emergency repairs to be made, electric wires to be spliced or similar jobs to be done, a lot of people would be on a spot themselves if they didn't keep Security Friction Tape always "Johnny-on-the-spot" in tool kits and on work benches.**

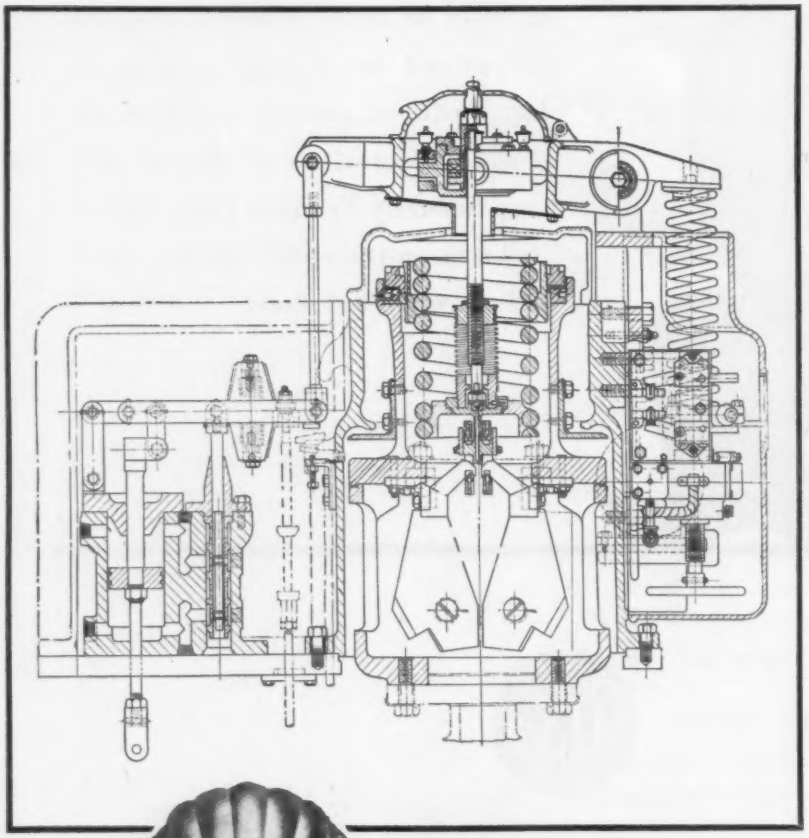
*Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.*

# UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.



# Why that sensitive turbine "BRAIN" needs this better turbine oil



THE GOVERNOR mechanism of a steam turbine is as delicately balanced as a finely made watch. Yet the oil that lubricates this sensitive turbine part must also be able to withstand the high speeds and pressures encountered in lubricating the main and thrust bearings.

It is under these extreme operating conditions that ordinary turbine oils break down. They oxidize rapidly . . . develop rust. If the oil does not have the properties to resist oxidation and prevent rust, you have trouble on your hands.

Rust, which may either be formed in the governor or carried into it by the oil, gets into the delicate mechanism, causing it to stick. And when an oil oxidizes it may form lacquer and sludge which in turn "gums up" the governor.

These are the problems Shell Engineers licked when they perfected Shell Turbo Oil. Developed expressly for turbine use, Shell Turbo Oil has *superior oxidation stability* as well as the ability to *prevent rust.* Drain and clean your turbines...then change to Shell Turbine Oil and you'll soon see *why* it was the first of its type to be approved as meeting rigid U. S. Navy specifications.

* * *

*Get the full details from your Shell man today. Write Shell Oil Company, Incorporated, 50 W. 50th St., New York 20, N.Y., or 100 Bush Street, San Francisco 6, California.*

SHELL

**SHELL TURBO OIL**

## LITTLE STARTERS
# with a big future
## (AND A FAMOUS PAST)

● Today thousands of these small Trumbull Manual Starters are standing up to the tough grind of war production . . . "on" and "off", "off" and "on", around the clock and often 7 days a week. Tomorrow these sturdy, safe, trouble-free controls will be furnished as integral parts of a new army of willing and efficient "electrical servants". See Motor Control Bulletin 404 for entire Trumbull Line.

### Type TT

Thermostatic Trumbull starters for small A.C. motors up to 1 hp 250 V. max., 1 and 2 Pole. Provide automatic protection against overload through accurately calibrated interchangeable relay heaters. Handles marked "on" and "off"; also with ampere rating tab. Trip free from handle. Cannot be held in against overload. Available in special enclosures. Also supplied as unit only for "built-in" mounting.

TT Unit

### Type MD-5

No overload protection. Used for transferring from one source of supply to another, from one motor to another on same supply, or as motor reversing controllers. 7½ hp 600 V. A.C. max., 2, 3 pole.

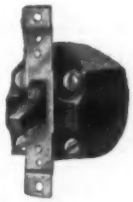
Double break construction, allowing quick throw-over without danger of arc-over between contacts or between line and load positions. Double butt, wiping contact under pressure. Quick break. Available in special enclosures. Units only, without enclosing case, find frequent application in motor control devices.

**TRUMBULL**
**SMALL MOTOR MANUAL STARTERS**

### Type RB

Without overload protection. Specially adapted for the control of small motor driven machines (2 hp max.) where overload or short circuit protection is provided in a separate device. Also used on heavy duty lighting circuits.

Sturdily built. Available in flush or surface mounted types for control of motors up to 2 hp 600 V. max.; 2, 3 or 4 pole and 3-way.



RB Unit

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY • PLAINVILLE, CONN. • A GENERAL ELECTRIC ORGANIZATION

OTHER FACTORIES AT NORWOOD (CINN.) O. — SEATTLE — SAN FRANCISCO — LOS ANGELES

# Again Available

## TO MEET MOST PRODUCTION SCHEDULES!

*At WESTON, production finally has outstripped the overwhelming war demand for panel and other instruments . . . making WESTONS again obtainable on a basis to meet most war production schedules.*

To experienced instrument users, this means they again can obtain the instruments whose design and manufacture incorporate the broadest instrument experience in surmounting the requirements of exacting applications. The instruments whose consistent, uniform performance simplifies their problems of inspection, handling and other burdensome procedure . . . and whose dependable, long-term accuracy assures better operating performance from the devices into which they're built.

Why not discuss your instrument schedules with WESTON, today . . . and be sure of obtaining the added product efficiency which authentic WESTONS provide.

- *Panel & Switchboard Instruments (DC, AC, and Thermo)*
- *Precision DC and AC Portables*
- *Instrument Transformers*
- *Specialized Test equipment*
- *Laboratory Standards*
- *Sensitive Relays*
- *Light Measurement Instruments*
- *Aircraft Instruments*
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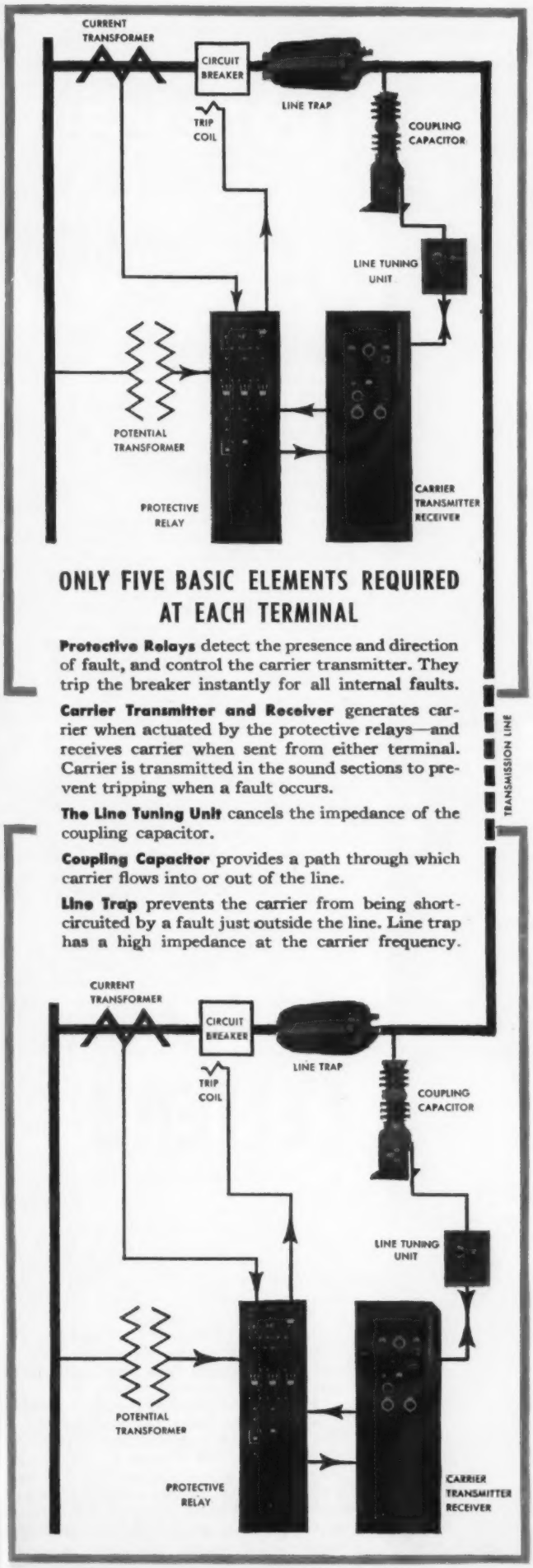
**Weston Electrical Instrument Corporation**
**618 Frelinghuysen Avenue, Newark 5, New Jersey**

***FOR OVER 55 YEARS LEADERS IN ELECTRICAL MEASURING INSTRUMENTS***




## ONLY FIVE BASIC ELEMENTS REQUIRED AT EACH TERMINAL

**Protective Relays** detect the presence and direction of fault, and control the carrier transmitter. They trip the breaker instantly for all internal faults.

**Carrier Transmitter and Receiver** generates carrier when actuated by the protective relays—and receives carrier when sent from either terminal. Carrier is transmitted in the sound sections to prevent tripping when a fault occurs.

**The Line Tuning Unit** cancels the impedance of the coupling capacitor.

**Coupling Capacitor** provides a path through which carrier flows into or out of the line.

**Line Trap** prevents the carrier from being short-circuited by a fault just outside the line. Line trap has a high impedance at the carrier frequency.

# DELIVER MORE KWH OVER YOUR LINES

## *with high-speed Carrier Relaying*

Increased loading and interconnection of power systems to serve heavy wartime loads have greatly multiplied the problems of relay protection. To maintain system stability and permit increased loads to be carried safely, requires rapid and selective clearing of faults.

By use of carrier channels for relaying the time delays normally encountered in conventional relay systems can be eliminated. It is possible to secure the full value of modern high-speed relaying over 100% of the line length.

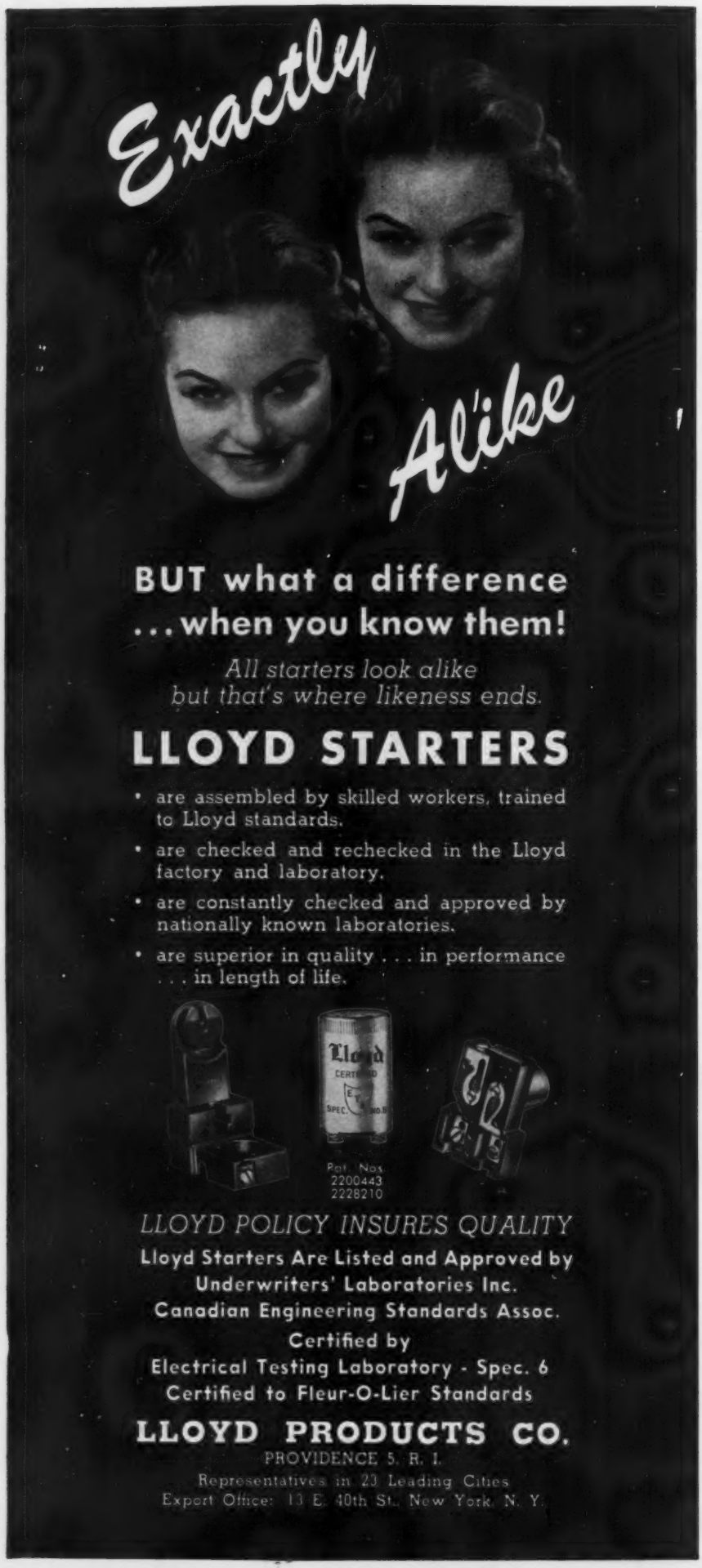
Thus load capacity of the system may be substantially increased—in some cases as much as 50%.

Carrier relaying is simple in application and uses a minimum of critical materials. Westinghouse equipment may be ordered to cover a wide application field. Your Westinghouse office is equipped to give valuable engineering assistance on any application. Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. J-95089

**Westinghouse**

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

*Electronics at Work*


Exactly
Alike
BUT what a difference
...when you know them!
All starters look alike
but that's where likeness ends.
LLOYD STARTERS
• are assembled by skilled workers, trained to Lloyd standards.
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er measurements, television and frequency modulated receiver design, etc.

Since the author is English the terminology is somewhat different; this does not seem to bother the average reader however. The author's presentation covers standard American design and components, although he does not refer to specific types of either English or American manufacturers. The book is full of mathematical deviations and formulas which are necessary for the design of radio receivers.

The book is well illustrated with charts, curves and diagrams which should prove very valuable to those interested in radio receiver design.—K.M.N.

COMMUNICATION CIRCUITS, by Lawrence A. Ware and Henry R. Reed, 330 pages, 5¾ x 8½, index, appendix, many figures and illustrations, John Wiley and Sons, $3.50. The study of electrical communication, either telephonic or wireless, requires the mastering of circuit theory. The various methods of attack are presented in a manner readily understood without the use of rigorous mathematical solutions. The text describes the use transmission line parameters, discusses various arrangements of networks and the network theorems involved for their solution. Circuits designed for high frequencies require a more careful design to eliminate unnecessary reflection losses, to couple and terminate the lines efficiently. Filter arrangements are shown, together with their frequency limitations, and are given good treatment.

Ultra-high-frequency or microwave practice has greatly changed during the last few years, and several chapters are devoted to the theoretical theory and design of rectangular and cylindrical wave guides. Coaxial design is important and is treated in a simple manner. A chapter entitled *Transmission Line Experiments* briefly describes the distribution of voltage and current along a line, velocity of propagation, determination of characteristics impedance and coupling arrangements to wave guides.

The appendix briefly treats fourier series, loop equations, hyperbolic functions and elements of Bessel functions.

This book is a valuable addition to the communication engineer's library. The material is well presented, the mathematics involved are limited to the solution of problems discussed, no attempt is made to give rigorous derivations of formulae.—F.S.B.

# LETTERS
## *to the editor*

The editor as well as his many friends were glad to hear again from Lt. R. F. Davies, USNR, especially after his ship, the USS *New Orleans* had been damaged. This is his message to the Northwest Electric Light & Power Assn.

"I want to thank you for making it possible for me to receive Electrical West. It was like a friend from home and others, besides myself, enjoyed reading it.

"I would like to receive another membership card. The one I had must by now be absorbed by the waters of 'Iron Bottom Bay' along with the rest of what worldly goods I once thought were indispensable. It is quite remarkable how one can forget and, in fact, not give one good blankety blank about anything but a whole skin and something to put inside it. Hi."

# L-M "PVD" FUSE CUTOUTS *always work*

● Operation of L-M "PVD" Fuse Cutouts is entirely independent of the door. Even if the door should become stuck from any cause, the "PVD" will always operate as a drop-out or disconnecting cutout.

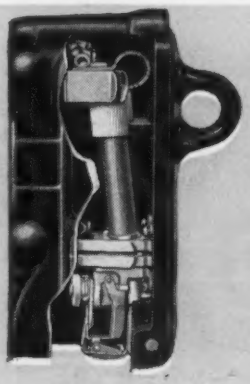
The fact that the door of the L-M "PVD" Fuse Cutout always remains closed means that working parts are fully protected at all times.

Positive, heavy contacts with large contact surfaces and elimination of intermediate current-carrying parts keep "PVD" operating temperatures low.

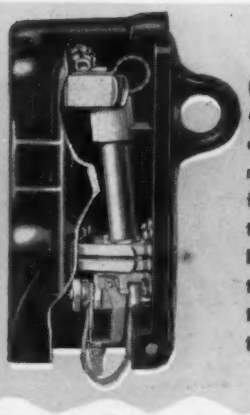
Arc is positively extinguished before any contacts move or separate. Then the large air gap prevents any re-establishing of the arc.

Tell-tale position of the dropped-out cartridge is readily visible from any direction and from a distance. Re-fusing is but a one-minute operation and can be done right on the pole, even with gloved hands.

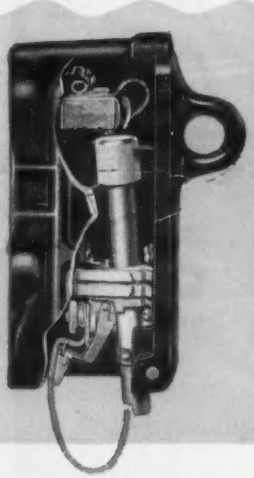
For full information, write Line Material Company, Milwaukee, Wisconsin.



**1** L-M "PVD" Fuse Cutout is always protected. Rugged Bakelite door remains closed at all times, sealing contacts and working parts from weather, dirt and corrosion.

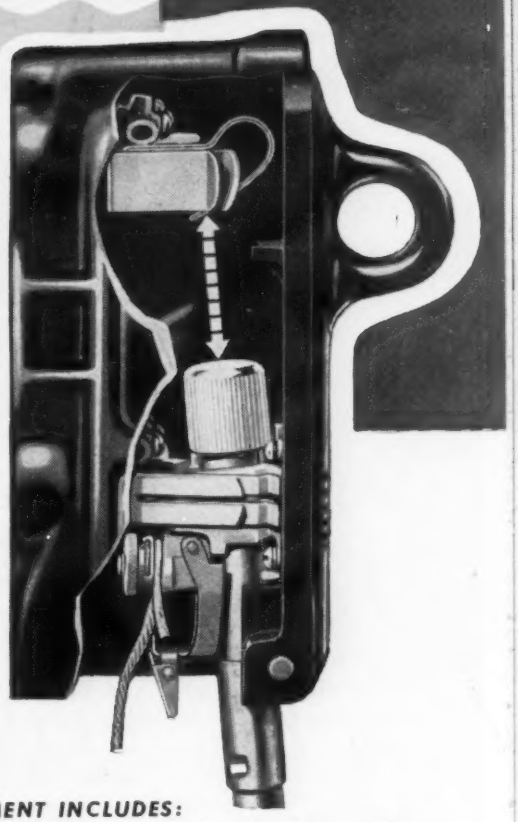


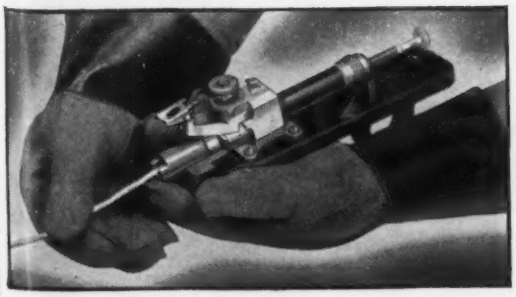
**2** Flip-out device snaps down and assures instant separation of the blown fuse link parts before the latching lever releases the tube to the indicating position. There is a positive time delay.



**3** Arc is cleared inside the tube before the contacts separate. Upper contact follows when dropping, thereby maintaining contact during a good portion of the downward travel of the tube, absolutely assuring that the arc is cleared.

**4** Large air gap between the contacts, when the tube has dropped to the indicating position, definitely prevents any re-establishing of arc. There is no leakage, no radio interference. "PVD" action is dependable and positive under all weather conditions. Dropped out tube is a signal seen from the ground.





Six seconds is plenty of time to re-fuse the "PVD". On-the-pole re-fusing is a safe, easy operation.

*L-M DISTRIBUTION EQUIPMENT INCLUDES:*

**Transformers • Fuse Cutouts • Lightning Arresters • Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street Lighting Equipment**

LM

# LINE MATERIAL COMPANY

## FUSE CUTOUTS

# EXPERIENCE WAS OUR DESIGNER

Experience, the sum total of success in solving countless problems in electrical control, guided us in the design of these switches and panel boards. Experience has taught us what to avoid as well as what to do, constructively.

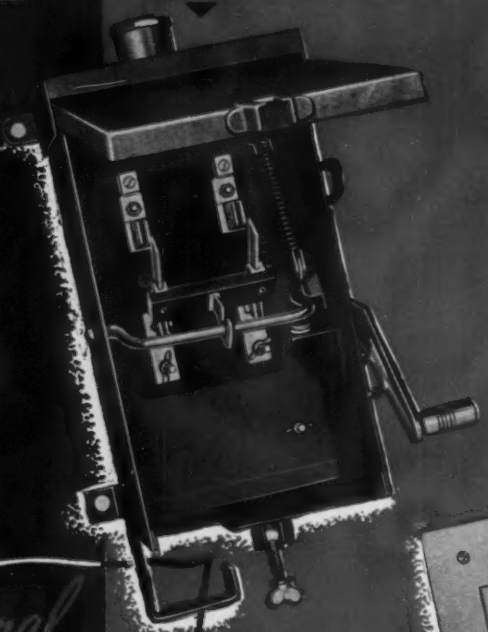
In these well built, long lived devices, simple but powerfully efficient, is the concrete evidence of many years of satisfying our customers. Let us discuss your electrical control problems and offer a solution. Our representatives are located in principal cities, coast-to-coast.

600 Volt Relarc Type Knife Blade Switch—30 to 600 amperes, 575 volts A.C. and 600 volts D.C. Maximum horsepower rated. Equipped with quick make and quick break mechanism and patented Federal Relarc arc snuffers. Available fusible and not fusible—2, 3 and 4 poles.

A smartly designed enclosure completes the sturdy, compact unit and protects Federal Switches.

100-ampere 600-volt Relarc switch. All Federal Knife Blade Type A switches equipped with positive pressure-type fuse clips.

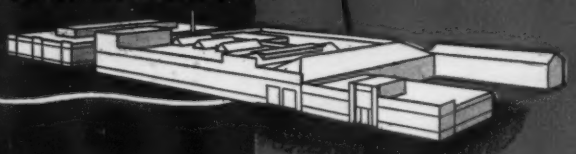
Rainright Switch with Federal visible knife blade construction, 100 amperes, 2 pole, 250 volt D.C. no-fuse Type C. Equipped with cable strain hook. All Federal switches are available in rainright enclosures.



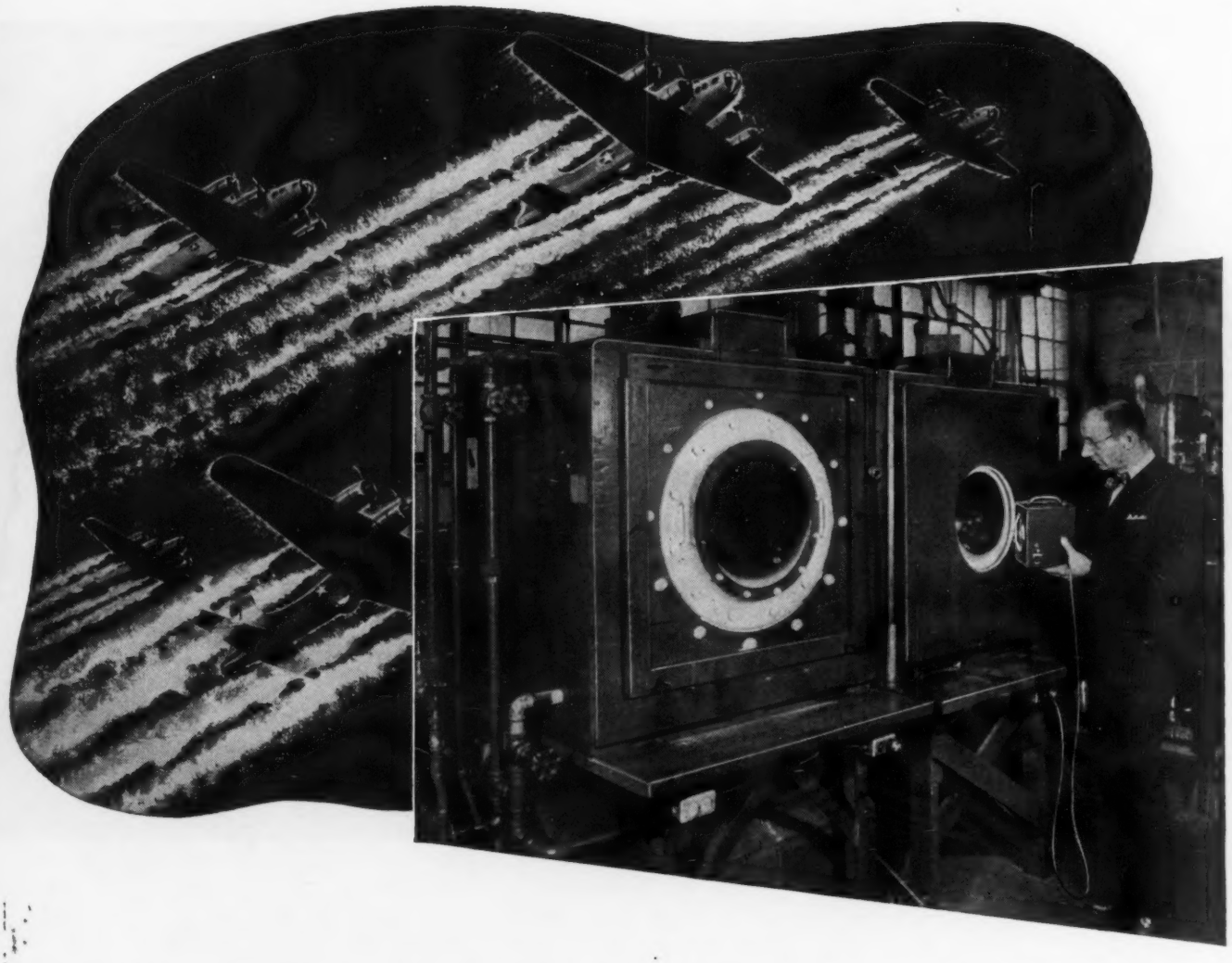
Federalite NTPS Lighting Panel board equipped with quick make and quick break toggle-type switches, molded bakelite units with heavy duty switch handles. Available from 4 to 40 circuits.

Federal

ELECTRIC PRODUCTS COMPANY
50 Paris St. • Newark, N. J.



SAFETY SWITCHES • PANELBOARDS • SWITCHBOARDS • CIRCUIT BREAKERS



# Aircraft Brush Life Increased Ten Times!

EXPERIMENTS carried through a step that no one had taken before revealed to National Carbon Company, Inc., research engineers the *cause* of the rapid disintegration of aircraft brushes at high altitudes.

Once the cause of the trouble was known, the remedy could be found. And today, eight new "National" brush grades for aircraft generators, motors, and other rotating electrical equipment are giving *ten times* the service life once obtained . . . from sea level up into the stratosphere.

A small thing . . . of tremendous importance . . . cleared the way for this National Carbon development. It consisted of *drying* the refrigerated, rarefied, test chamber air in which performance of aircraft brushes was analyzed.

No one had done that before for carbon brushes . . . actually brought the stratosphere down to earth so that failing brushes could be closely studied . . . so needed changes could be made . . . until the problem was solved.

**This type of research experience has been—and will be—applied to further development of industrial and fractional horse power brushes for all types of rotating electrical equipment.**

On brush operation and care—write for "Modern Pyramids" to National Carbon Company, Inc., Cleveland 1, Ohio, Dept. 17F.

★ *BUY UNITED STATES WAR BONDS* ★

The word "National" is a registered trade-mark of National Carbon Company, Inc.

## NATIONAL CARBON COMPANY, INC.

*Unit of Union Carbide and Carbon Corporation*

CARBON PRODUCTS DIVISION, Cleveland 1, Ohio UCC New York, Pittsburgh, Chicago, San Francisco

# "7 YEARS' CONTINUOUS OPERATION, ...NO FILTERING, MAINTENANCE NEGLIGIBLE"

## ...REPORTS A NEW ENGLAND COMPANY ON ITS EXPERIENCE WITH A 10,000-KVA, 66-KV PYRANOL POWER TRANSFORMER

SEVEN years ago the engineers of this New England utility needed a 10,000-kva, 66,000-volt transformer to be used between a water-wheel generator and a high-voltage bus. They wanted to install the transformer *indoors* to avoid the high cost of long runs of heavy copper. They also wanted to avoid concrete cells with specially designed drainage facilities. Hence a noninflammable transformer was needed—one that would not require a fireproof vault and yet would provide the greatest degree of safety.

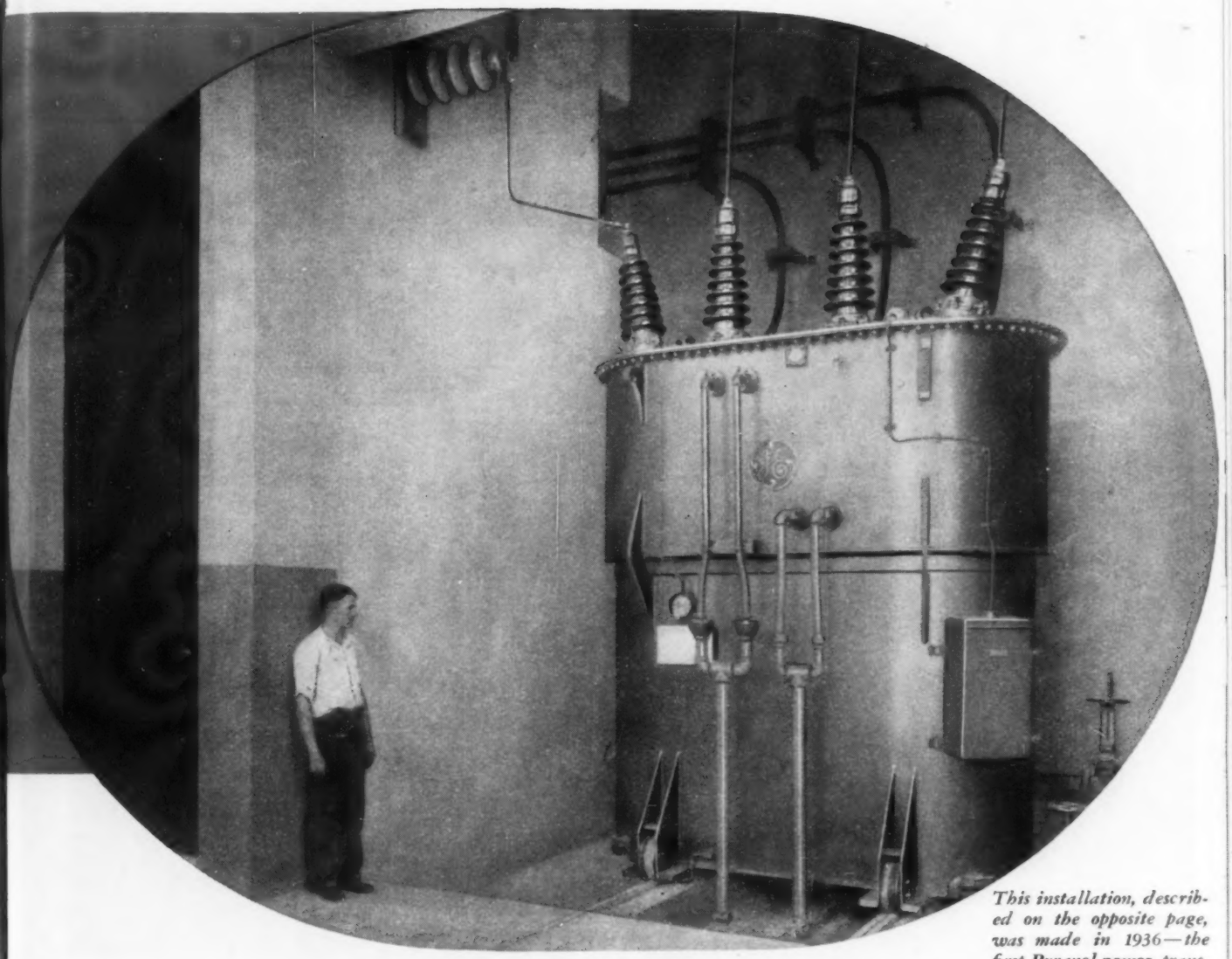
Pyranol* transformers, although introduced, commercially, only four years before this, had already proved themselves for indoor applications. Never had one burned or contributed to a fire. Operating records were uniformly excellent. But, for the most part, these had been applied to handle relatively small amounts of power at low or moderate voltage.

These engineers reasoned, and rightly so, why shouldn't a noninflammable Pyranol transformer be the economical choice for this large-capacity, high-voltage application? So a Pyranol power transformer was selected.

The wisdom of this choice has been amply demonstrated over the past seven years. The transformer has been in almost continuous operation, carrying varying loads up to its maximum rating. Samples of the Pyranol liquid have been taken from the transformer every year, and in each case analysis has proved that the Pyranol has maintained its original high quality. The time and expense of filtering have been avoided; there has been little need for maintenance of any kind.

*Every week 192,000 G-E employees purchase more than a million dollars' worth of War Bonds.*

*Reg. U. S. Pat. Off.



*This installation, described on the opposite page, was made in 1936—the first Pyranol* **power** *transformer application.*

THE benefits of Pyranol transformers, which have made them famous for distribution applications indoors, are just as real for *power-transformer* applications. For example:

- You can install them anywhere you wish, indoors or outdoors.
- Their inherent safety means that fireproof vaults or other fire protection is not required. Construction materials and installation time can often be saved.
- Pyranol is a stable liquid. It is nonoxidizing and nonsludging, and has high dielectric strength. Filtering is seldom, if ever, required.

It will pay you to consider the advantages of Pyranol for your transformer installations—large as well as small—wherever the elimination of fire hazard is an important factor. Ask for Bulletin GEA-4193. *General Electric Company, Schenectady 5, N. Y.*

**PYRANOL POWER TRANSFORMERS**

. . . available for circuits up to 69,000 volts

**GENERAL ELECTRIC**

# KLEINS

## TOOLS YOU CAN RELY ON

WHEN you read of a new Naval victory—a new Army advance—you know that Klein pliers are helping our fighting forces get their job done.

Today, the demands of war for quality tools, both on the battle-fronts abroad and on the industrial front at home, are so great that many Klein users are forced to wait until Victory before they can again secure the tools they need.

The name Klein today still stands for the highest quality in pliers, just as it has for nearly a century.

And here at Mathias Klein & Sons we are producing more of these quality tools than ever before.

When the war is won, this production will again assure you a constant supply of pliers and wrenches, grips and climbers, belts and straps—the same quality tools and equipment that have served the electrical industry "since 1857."

**ASK YOUR SUPPLIER**

***Foreign Distributor:***

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*This book on the care and safe use of tools will be sent on request.*

***Since 1857***

**Mathias KLEIN & Sons**

**Established 1857** — **Chicago, Ill., U.S.A.**

3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS


# PRODUCTS

***that are news***

### Electronic Relay (600)

General Electric recently introduced an electronic relay for amplifying the limited current transmitted by delicate control contacts or high-resistance circuits. The unit is said to be particularly suited to controlling liquid levels in tanks and boilers, sorting metallic parts by size, detecting broken threads in textile machines and as a limit switch requiring light pressure to operate. It is operated by any material having a resistance of from 0 to 500,000 ohms.

The unit consists of a standard type electronic tube, a supply transformer and an electromagnetic relay. It is in a weather-resistant enclosure for wall or machine mounting.

### Bi-Post Reflector (601)

Curtis Lighting, Inc. has developed a new reflector for the 750-watt bi-post lamp as one in its line of X-Ray Silver Mirror units. These reflectors are for use in airplane hangars, ordnance plants, armories and for general factory and high-bay installations. Finish is gray on metal parts and "golden armor" on the reflector. The new unit has a heavy-gauge steel band to support the reflector and absorb shock. It also is supported at the neck by spring clips forming part of the tripod holder arrangement. A duplex hanger may be used with the reflector when pairs are required.

### Overload Relay (602)

A bimetallic overload relay for changing from automatic to hand reset has been designed by Square D Co. Feature of this relay, according to the manufacturer, is a simple means of adjusting the tripping point from 85 to 115% of nominal rating, permitting setting changes to take care of variations in ambient temperature or load conditions at the motor. It is designed for separate mounting or front mounting on size 0 and 1 starters and is said to be well suited for use in built-in machine tool control since need for external reset mechanisms is eliminated.

# New Wartime Booklets Help Maintain Frigidaire Dealers as Refrigeration Headquarters

101
Refrigerator Helps
How to store and keep food properly under today's conditions. Easy ways to give your refrigerator the best of care. Tested recipes. Read and keep for future reference. Published for all refrigerator users by FRIGIDAIRE Division of General Motors
Contains No Advertising (except on pages 32-33)
Conservation Tips
on the use and care of Commercial Refrigeration and Air Conditioning Equipment
Published for Users of All Makes by Frigidaire Division of General Motors
CONTAINS NO ADVERTISING (Except on last two pages)
Care of Compressors
Care of Cooling Units and Controls
Safeguards for Air Conditioning Equipment
Tips on Water Cooling
Hints for Food Handlers
Guide to Food Storage
Care of Fixtures
Storage of Miscellaneous Products
Hints for Locker Plant Operators
Things to Do Before Calling the Serviceman

101 REFRIGERATOR HELPS is filled with suggestions about the wartime care of the household refrigerator. CONSERVATION TIPS tells how to get better results; reduce operating cost and upkeep expense; prolong the life of all Commercial Refrigeration and Air Conditioning equipment.

**Some of the Ways Frigidaire Dealers* Are Using These FREE Booklets:**

- Offering in newspaper advertisements and radio "spot" announcements.
- Mailing to selected store customers.
- Leaving with refrigerator users on service calls.
- Mailing to Frigidaire users.
- Distributing to nutrition classes and cooking schools.
- Mailing to selected lists of apartment and building managers, hospitals, industrial plants, institutions.
- Advertising in store and window displays.
- Distributing to store visitors.
- Distributing through women's clubs, church groups, study clubs, and Parent Teachers Associations.
- Distributing through County Home Demonstration Agents.
- Mailing to employees.
- Supplying to trade associations and similar groups.

*Using these same methods of distributing "Wartime Suggestions"—a companion booklet to "101 Refrigerator Helps"—Frigidaire Dealers placed over 7,000,000 copies in the hands of refrigerator users.

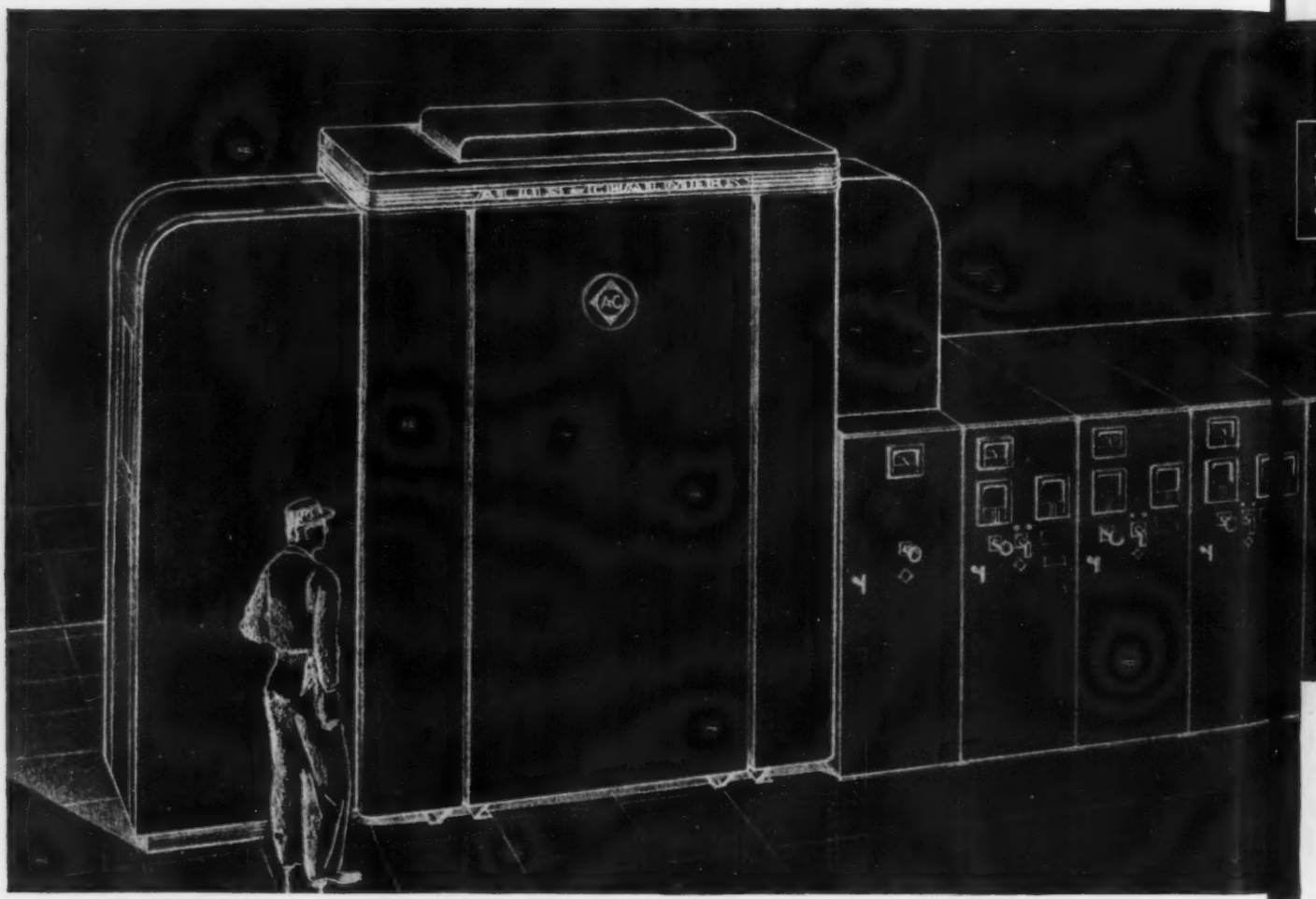
These two new booklets are typical examples of the wartime help Frigidaire Dealers are giving refrigeration users everywhere. They are helping to keep vital refrigeration equipment in operation. Prepared by Frigidaire, these booklets currently are being distributed to refrigerator users by Frigidaire Dealers. In this way, Frigidaire Dealers are making a worth-while contribution towards the protection of America's wartime food supply. At the same time, they are building good will for the future and keeping themselves closely in touch with the refrigeration market.

For Excellence in War Production
FRIGIDAIRE
Division of
GENERAL MOTORS
DAYTON 1, OHIO · LEASIDE, ONTARIO
Peacetime builders of
ELECTRIC REFRIGERATORS · RANGES · WATER HEATERS
HOME FREEZERS · ICE CREAM CABINETS
COMMERCIAL REFRIGERATION · AIR CONDITIONERS
BEVERAGE, MILK, AND WATER COOLERS

# This "194X" Substation

HERE'S A "DOUBLE-HEADER" DESIGNED FOR GOOD LOOKS

INDUSTRIAL PLANTS. THE ENTIRE UNIT IS DRY TYPE--



WHEN the substation shown above is placed in operation, it will serve a large industrial plant with power for big motors and lighting substations . . . stepping down from 13,200 v. to 2300 v.

Note features of the new streamlined design. Several feet of floor space is saved by the concealed throat connection between transformers and switchgear . . . and there is no break in the smooth-flowing lines of the unit. Dry type transformers are efficiently self-cooled due to "chimney effect" of casing design.

Eliminating the element of liquid entirely, the new Allis-Chalmers magnetic air circuit breaker is employed in the vertical lift switchgear.

Substations of the type described will be offered for multi-circuit service in all sizes. Look for other important developments in electrical and power equipment from Allis-Chalmers. Maybe we can help you.

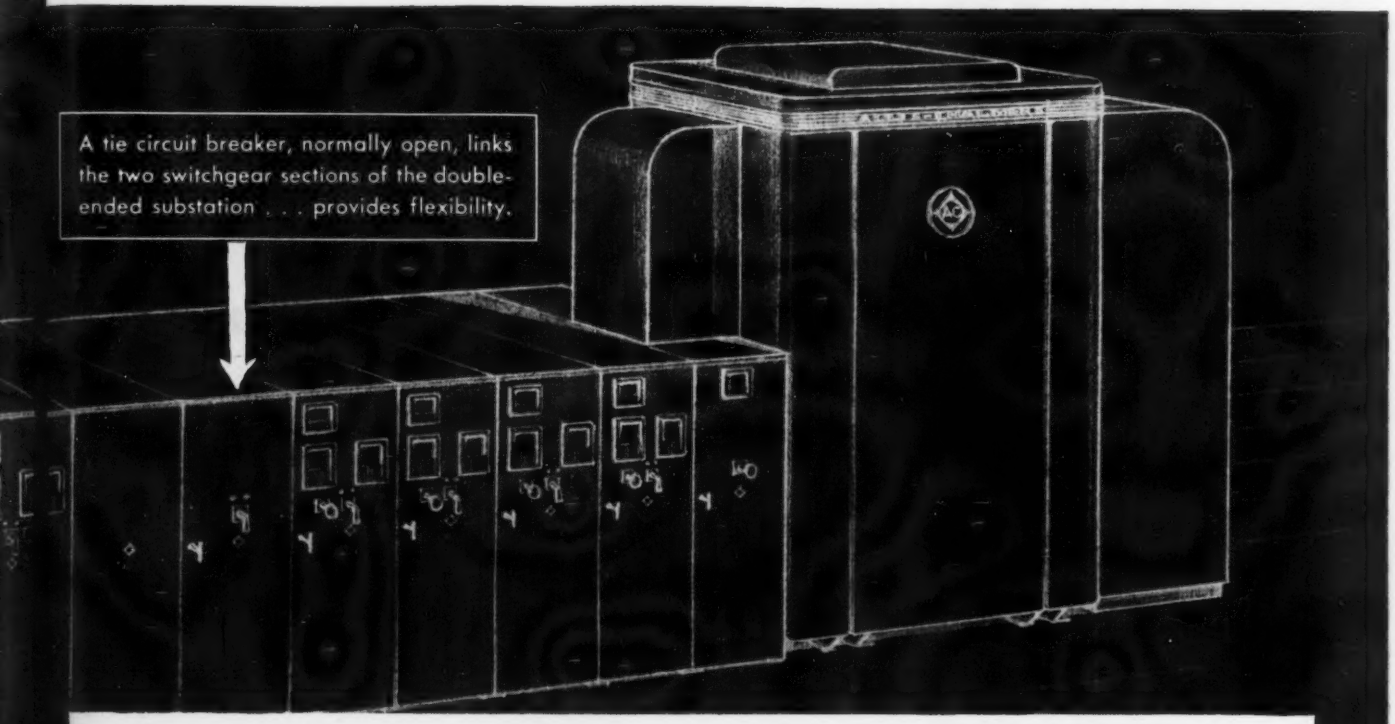
ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 1763

ALLIS

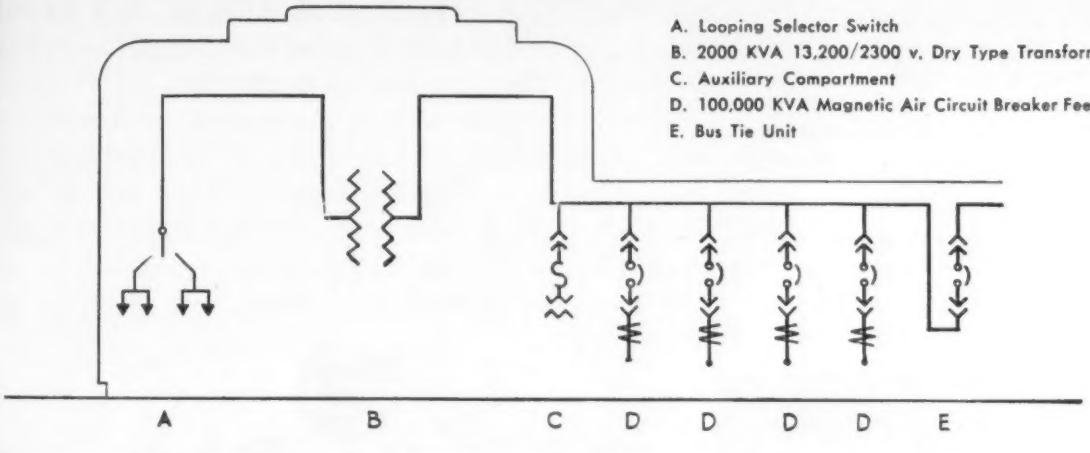
# Can Be Yours Today!

AS WELL AS SAFE, DEPENDABLE SERVICE IN UP-TO-DATE

NOT A DROP OF LIQUID IN IT--AND IS RATED 4000 KVA.


A tie circuit breaker, normally open, links the two switchgear sections of the double-ended substation . . . provides flexibility.

**SIMPLE ELECTRICAL DIAGRAM OF ONE HALF OF TYPE MCS DOUBLE-ENDED INDOOR UNIT SUBSTATION, RATED 4000 KVA**




# CHALMERS

♪ *Tune in the famous Boston "Pops", Blue Network, Saturdays at 8:30 pm, EWT.*

*Many motor-generators and rotary converters well along in years must be kept on the job these days. But their aged insulation is a constant trouble threat in case of overloads.*

# Over-Age Generators

## GET A NEW LEASE ON LIFE

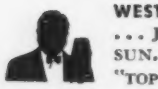
To prevent breakdowns as a result of insulation failure, Westinghouse *Manufacturing and Repair** Plants, conveniently located in every district, offer a carefully worked-out plan.

These local M & R Plants arrange definite reconditioning schedules on short-life-expectancy apparatus. Each piece of equipment in a customer's plant is scheduled for repair when it will involve a minimum interruption in production. Old insulation is replaced, the equipment returned in first-class shape.

By preventing unexpected failures which might cause serious damage to the apparatus, this plan eliminates long production shutdowns. And usually reconditioning permits heavier loading of the rebuilt equipment, thus increasing production.

This economical and efficient plan, endorsed and used by many industries, is typical of Westinghouse M & R service. This nationwide organization, with local branches as near as your telephone, is equipped to give you complete, dependable repair service on any type of electrical equipment.

J-90523



**WESTINGHOUSE PRESENTS**
. . . JOHN CHARLES THOMAS
SUN. 2:30 EWT., NBC.
"TOP OF THE EVENING"
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*When vital electrical equipment needs repair . . . phone the nearest office of Westinghouse Electric and Manufacturing Company for*

# Westinghouse

## COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU

# THEY ALWAYS FIT!!!

*because of*

## UNIFORM CONTOUR

*and*

## DIMENSIONAL PERFECTION

**ILLINOIS**
**HIGH TENSION GOOSENECK**
**PORCELAIN**
**FOR TRANSFORMER ENTRANCE WIRES**

**ILLINOIS PORCELAIN BUSHINGS**

**ILLINOIS POTHEAD PORCELAIN**

**The value of proper facilities, experience, production control, and step by step inspection is brought out in the manufacture of such porcelain products as featured on this page. For example, in ILLINOIS Pothead Porcelain the surfaces of every piece, both at top and bottom, are parallel. You get perfect alignment of porcelain hole and mounting base in ILLINOIS Porcelain Bushings. ILLINOIS is equipped to make all sizes and shapes of Gooseneck Porcelain Bushings to the transformer builders' specifications.**

***Write for catalog***

**HIGH DIELECTRIC STRENGTH**

**HIGH MECHANICAL STRENGTH**

**EXACT DIMENSIONS AND UNIFORMITY**

## ILLINOIS ELECTRIC PORCELAIN CO.

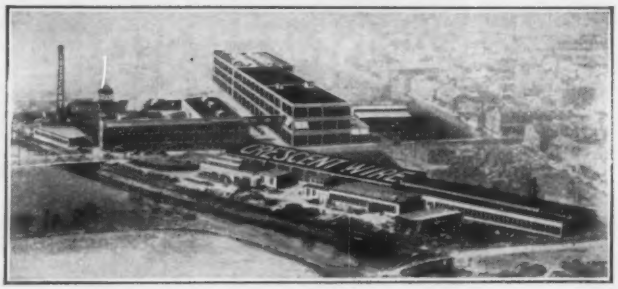
MACOMB, ILLINOIS

• IMPERIAL NEOPRENE JACKETED PORTABLE CABLES •

THE

# CRESCENT

## NATION WIDE ORGANIZATION




*originating at this factory at Trenton, N. J., serves the nation from coast to coast. Wherever you are located, these Representatives stand ready to assist you:*

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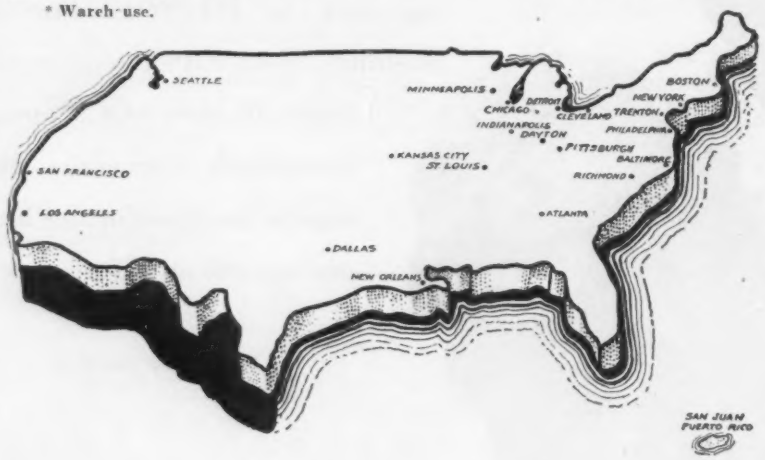



CRESCENT INSULATED WIRE CABLE CO.

TRENTON, N. J.

# CRESCENT

## WIRE and CABLE

• RUBBER POWER CABLES • VARNISHED CAMBRIC CABLES •

• ARMORED CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • BUILDING WIRE • PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES •

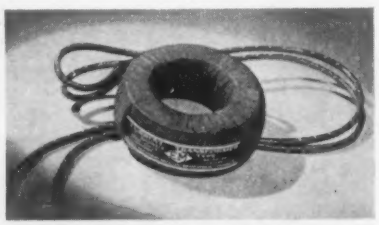
### Multi-Contact Timer (603)

A new multi-contact timer for remote control has been designed by the R. W. Cramer Co. Its uses are to control a series of machine operations in definite order; to automatically reverse or alternate in operation a group of motors, machines or devices; to operate in a predetermined sequence a series of signals, valves or solenoids and other applications where sequence operations are important.

Its solenoid starting mechanism is operated from a remote control momentary start button, so that the timer will go through its complete cycle or any part of it and stop. Reclosing the momentary start button will continue or repeat the cycle, it is stated. It can be set so that, in event of a power interruption, it is necessary to again press the remote control start button to continue the cycle, or so that, when power is restored, the cycle of operation is continued automatically.

### Current Transformer (604)

Electric Machinery Mfg. Co. is making a "donut" current transformer, "inserted primary" type, for use with indicating type a-c ammeters. These transformers are built standard in 200/5-, 300/5-, 400/5- and 500/5-amp. ratios and special ratios can be furnished. Ratio accuracy is said to be 1%



for ranges above 300 amp. and 2% for ranges 300 amp. and below on frequencies of 25 to 133 cycles and from 15 to 150% load. Rated burden is 2 volt-amperes. Lower ratios can be obtained by passing the primary conductor through the transformer two or more times, it is stated.

### Aircraft Breakers (605)

Square D Co. is offering a new line of push type circuit breakers designed for aircraft use but said to be suitable for boats, tanks and other mobile units having power sources up to 30 volts d-c. This manual reset breaker is available in sizes 5 to 50 amp., and is built according to Navy specifications. The unit is of non trip free construction and all devices are equipped with luminous indicating rings visible on trip in darkness and with a red indicating ring for daylight indication, according to the announcement.

### Protective Closures (606)

Cel-O-Seal caps are being offered by DuPont for protection of aircraft tubing and hex nuts against dirt, tampering and rust. It is claimed that the closures are applied by hand on an average of 20 to 25 a minute. They shrink in drying and conform to the contours over which they are placed. As a protection against sabotage, reopening of a once sealed tube is a signal to plant inspectors of tampering, it is stated. Specifications of the seals vary to suit the particular need of the application.

*Presenting*

# THE COP

(Cut-Out-Premium)

# STARTER

"One of Sylvania's Finest"

## SYLVANIA FS GLOSTAT STARTER

WITH BETTER THAN EVER PERFORMANCE

A metal flag is spot-welded to the stationary contact post in the gas-actuated Sylvania FS Glostat Starter. This metal flag assures correct lamp cathode pre-heating. The new FS Glostat Starter is quicker-starting, can take rough handling, and preheats adequately for maximum lamp life. Recommended by Sylvania engineers for economy and efficiency in smaller fluorescent installations.

The COP (Cut-Out-Premium) Starter is ready to patrol your fluorescent installation to protect your lighting investment. The COP brings you the finest method yet designed by Sylvania engineers to cut a failed lamp out of the circuit.

The COP is equipped with a handy push button to reset the positive new circuit breaker. When you replace a failed lamp, you just push the button, and the COP continues to operate normally until another lamp fails.

The COP has shown a life expectancy five times that of the average starter in months of exhaustive tests under all possible operating conditions. That is why Sylvania particularly recommends the COP as a means of reducing the cost of maintaining fluorescent.

The COP stops annoying lamp blinking and flickering by cutting a failed lamp out of the circuit immediately.

The COP guards your electric meter, preventing waste of current.

The COP protects the ballast from overheating.

Post the COP, Sylvania's finest quality starter, on your own fluorescent "beats." For information, write to Sylvania Electric Products Inc., Boston Street, Salem, Massachusetts.

*One Standard—the Highest Anywhere Known*

# SYLVANIA

## ELECTRIC PRODUCTS INC.

**SALEM, MASSACHUSETTS**

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FLUORESCENT LAMPS, FIXTURES AND ACCESSORIES, INCANDESCENT LAMPS, RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES

# Synthetic Rubber Replaces NATURAL RUBBER INSULATIONS AND SHEATHS ON SIMPLEX WIRES AND CABLES

Early in the war the scarcity of natural rubber made conservation necessary in order to make the best use of what was available. Our standards of quality and service had to be maintained with less rubber than we had been using. A few months ago, because of the rapidly dwindling supply of natural rubber, a complete change to synthetic rubber became imperative. Natural rubber could no longer be used in conductor insulation or cable sheath.

In anticipation of just such a situation, we already had investigated available substitute materials and were well along in the development of insulations and sheaths to replace all of our standard natural rubber compounds. The change-over is now practically complete.

A synthetic rubber compound has been provided to replace each of our special purpose, natural rubber insulations and sheaths. Laboratory tests and service records already indicate that they may be depended upon for trouble-free, efficient service. The technical and engineering skill that made our natural rubber compounds outstanding is now focused on obtaining even better quality and service with the new synthetic compounds.

If your postwar plans call for insulated wires and cables, or if you need them now for essential war work, it will be well worth your while to learn more about Simplex wires and cables with their new synthetic insulations and sheaths.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

Simplex

WIRES and CABLES

PACIFIC COAST OFFICES

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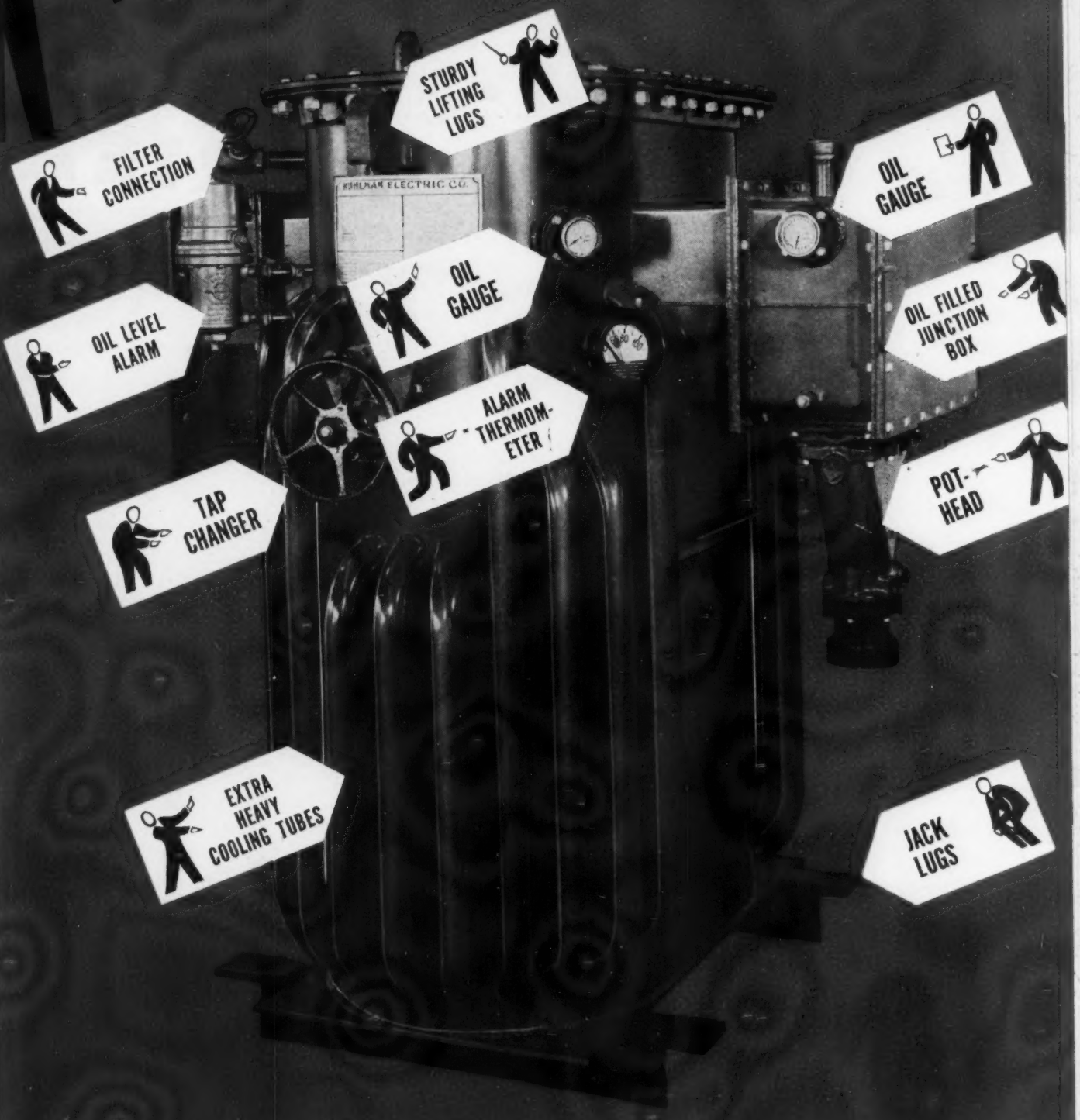
# SPECIAL KUHLMAN POWER TRANSFORMER BUILT TO TYPICAL KUHLMAN HIGH STANDARDS OF CONSTRUCTION




Whether its a special or a standard type of transformer, no detail is over-looked in the mechanical or electrical construction of Kuhlman Transformers. For facts about Kuhlman Power, C.S.P., Saf-T-Kuhl or Distribution Transformers or Line Regulators write to:

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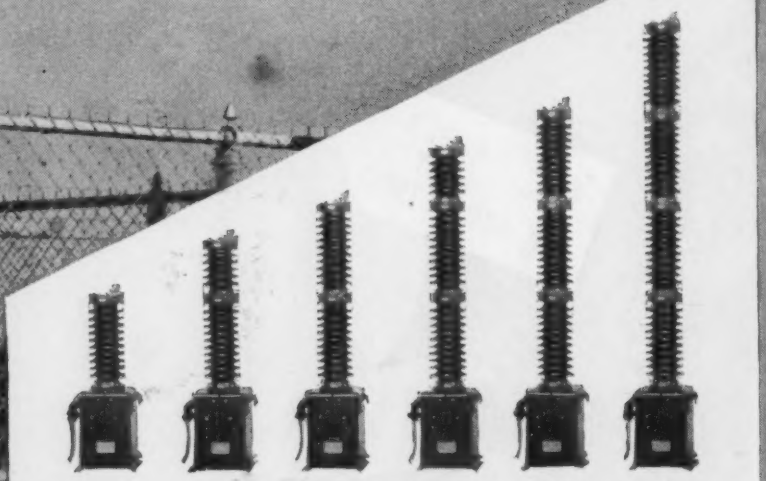
# . . . Good

# CARRIER-




This "family" of standardized G-E Type CW carrier-current coupling capacitors and Type KA potential devices permits assemblies of any established voltage ratings.

GENERAL ELECTRIC

# *Coupling for better* CURRENT SERVICE

COUPLING capacitors are the bridge between carrier equipment and the power line. They couple two fields of engineering — electric power and electronics. Joint use of lines for carrier current and power requires coupling capacitor units capable of withstanding the highest transmission line voltages and of passing the lowest carrier-frequency voltage.

G-E engineers have pioneered almost every outstanding achievement in carrier-current development. In G-E Type CW coupling capacitors they have developed coupling of extraordinary structural and electrical dependability. This coupling faithfully passes one or more carrier frequencies — regardless of lightning, line-switching surges, rain, snow and sleet. It also has permitted many existing carrier-current installations to take on extra-heavy war duties. When combined with G-E potential devices, this coupling greatly reduces the size, weight and cost of critical materials necessary to provide potential for synchronizing, relaying, and similar services.

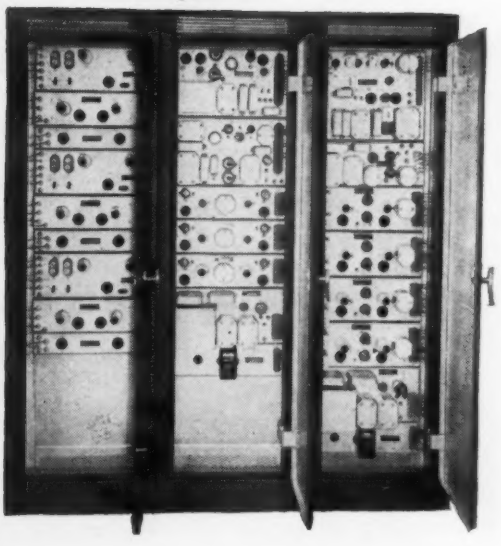
In the past ten years, more than 8000 G-E CW capacitor units have been applied to new carrier-current installations, and modernization of old ones—*without a single electrical failure.*

General Electric engineers are prepared to discuss — *now* — the carrier-current services and equipment which may be advantageously applied to your particular light-and-power system — either toward immediate operating improvements or as a part of your expansion program. *General Electric, Schenectady, N. Y.*

• *Tune in* "The World Today" *every evening except Sunday at 6:45 E.W.T. over CBS. On Sunday listen to the G-E* "All Girl Orchestra" *at 10 P. M. E.W.T. over NBC.*

**ANY COMBINATION OF CARRIER-CURRENT SERVICES YOU NEED**

may be made from 77 different G-E standard "Panel Units"—housed in standard cabinets of convenient size for indoor or outdoor installation. Major carrier functions include: ***Pilot Relaying. Transferred Tripping. Signaling. Telephony. Telemetering. Supervisory Control. Automatic Load Control. Line Sectionalizing Control.***



**GENERAL ELECTRIC HAS PLANNED AND BUILT MORE CARRIER-CURRENT EQUIPMENT THAN ALL OTHER MANUFACTURERS COMBINED**

**CARRIER CURRENT**

*THE NERVE NETWORK OF THE POWER SYSTEM*

# Distribution Transformers BUILT RIGHT, SHIPPED RIGHT— ON SCHEDULE!

"Crated to get there"—these Gardner standard distribution transformers averaged 30 days from order to shipping date.

Crating doesn't improve transformers — but in this detail, Gardner exercises extra care to insure undamaged delivery.

The transformers shown are examples of Gardner's delivery in good condition and on schedule — even in 1944. Orders for these 7½ kva units were placed between Jan. 25 and Feb. 29. All were shipped March 13.

Even Gardner can't always offer such deliveries — occasionally military orders must have right-of-way. However, Gardner's expanded Pacific Coast plant and stocks assure buyers utmost delivery speed. Quality workmanship throughout, evidenced by a detail such as crates, brings you years of trouble-free operation.

Check Gardner the next time you need standard or special transformers.

**Gardner Electric Mfg. Co.**

4227 Hollis St. Emeryville 8, Calif.

REPRESENTED BY

MAYDWELL & HARTZELL INCORPORATED

SAN FRANCISCO LOS ANGELES SEATTLE


### Relay Contactor (607)

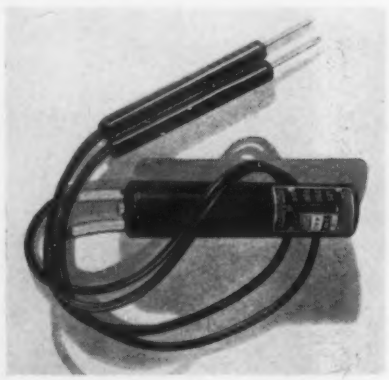
Glenn-Roberts Co. has a new relay contactor which it states was developed for heavy-duty circuit control under adverse conditions. A vertical solenoid actuated by a sturdy coil rigidly mounted on the relay core frame operates a molded bridge carrying heavy-duty spring-loaded contact bars on which large-diameter silver alloy contacts are mounted. Matching silver alloy contacts are mounted on a double break "wiping" action, it is stated.

The contact carrying bridges are designed to allow for additional "decks," permitting a wide range of contact arrangement. Single- or dual-voltage operating coils for all standard voltages are available; seal current, pickup and drop-out voltage is low, it is stated. Standard units are rated at 30 amp. at 110 volts, 20 amp. at 220 volts, 10 amp. at 440 volts.

### Voltage Tester (608)

Square D Co. has a voltage tester to test without lamps, give positive voltage identification and distinguish between a-c and d-c. A-c voltage markings are 110, 220, 440 and 550; d-c markings are 125, 250 and 600. Frequencies can be determined by the vibrations of the indicator.

The device is housed in a cylindrical fiber case. Four-inch fiber grips on the leads give complete insulation and leads are 24-in. flexible wire, with double-thickness rubber insulation vulcanized to the wire to prevent slipping. A peg and spring assembly prevent sharp bending and breaking of leads where they enter the case. Sharp spear points on the ends of the leads permit piercing of wire insulation for testing without damaging it.



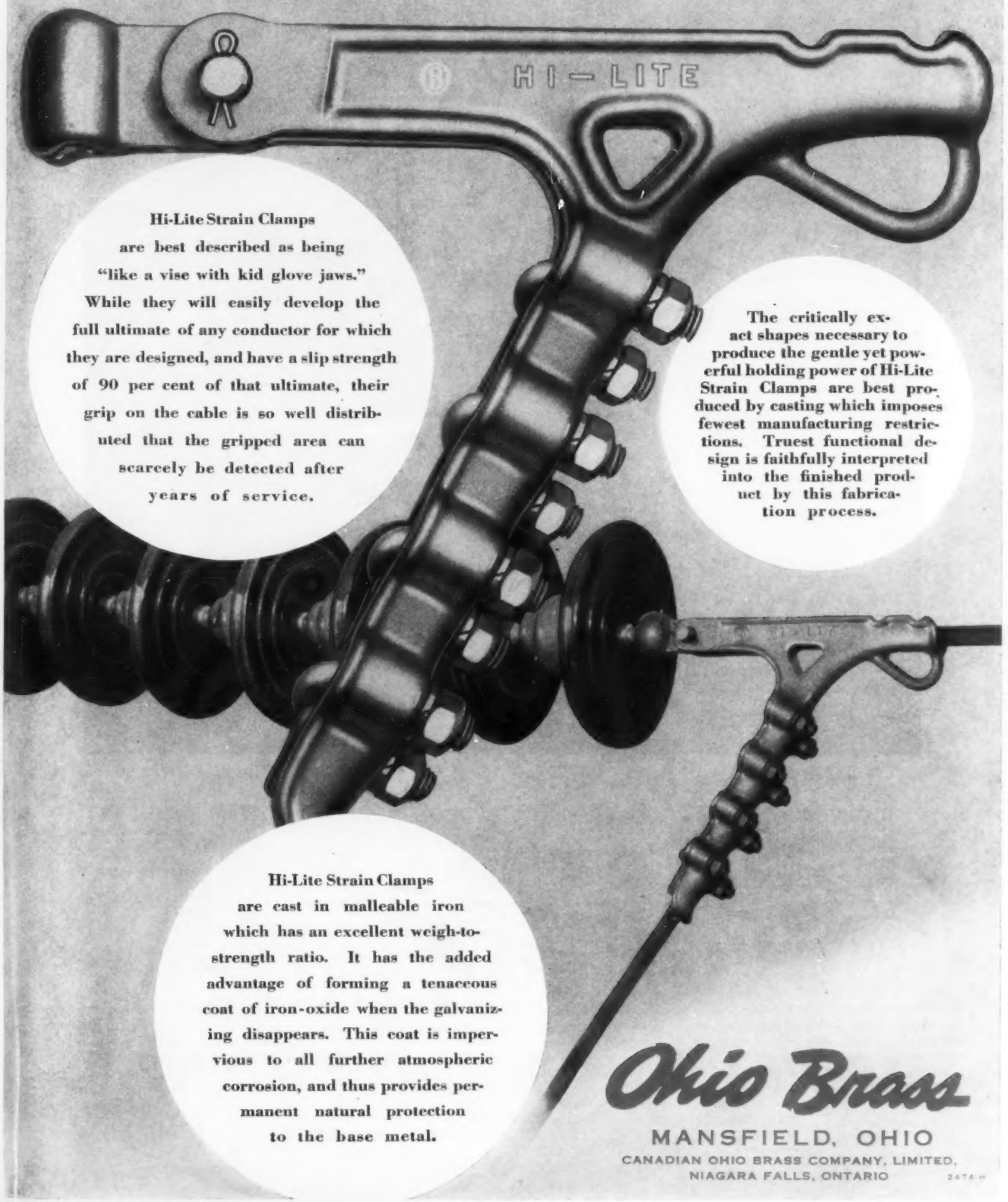
### Indicating Light (609)

Graybar is distributing the H. R. Kirkland Co.'s new indicating light unit with a bayonet locked lens cap. The new T3-BLC unit is for use with a T3¼ type single contact bayonet lamp bulb and embodies a new design of lamp socket, said to be free from press fit methods of assembly and to provide a direct electrical connection from the shell and the center contact pin to the terminal spades.

### "Quick Start" Ballast (610)

Acme Electric & Mfg. Co. has announced a "quick start" ballast for use with fluorescent lamps. It is available in dual 40-watt size for two 40-watt lamps in either end-lead or bottom-lead designs. Operated from standard 115/120 primary circuit, it is said to boost the voltage to approximately 450 volts for lamp starting.

# How And Why The Hi-Lite Clamp Works




Hi-Lite Strain Clamps are best described as being "like a vise with kid glove jaws." While they will easily develop the full ultimate of any conductor for which they are designed, and have a slip strength of 90 per cent of that ultimate, their grip on the cable is so well distributed that the gripped area can scarcely be detected after years of service.

The critically exact shapes necessary to produce the gentle yet powerful holding power of Hi-Lite Strain Clamps are best produced by casting which imposes fewest manufacturing restrictions. Truest functional design is faithfully interpreted into the finished product by this fabrication process.

Hi-Lite Strain Clamps are cast in malleable iron which has an excellent weigh-to-strength ratio. It has the added advantage of forming a tenaceous coat of iron-oxide when the galvanizing disappears. This coat is impervious to all further atmospheric corrosion, and thus provides permanent natural protection to the base metal.

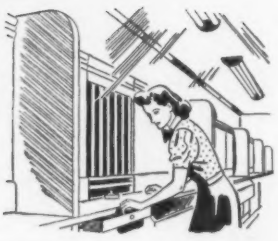
Ohio Brass

MANSFIELD, OHIO

CANADIAN OHIO BRASS COMPANY, LIMITED, NIAGARA FALLS, ONTARIO

2474-H

# 130,000 REASONS



From better See-ability for war work will come higher levels of lighting for everyone—greater efficiency for business and industry, better living for American homes. As soon as materials and manufacturing facilities are available, Westinghouse will lead the way in such lighting developments as: (1) Long thin fluorescent lamps in new shapes and sizes, for store display and feature lighting. (2) A brighter kitchen for lighter work—supplementary light for the sink, inside dark cupboards, over work surfaces. (3) Soft, comfortable fluorescent light in banks and offices for faster, more accurate work. For leadership in lighting, today and tomorrow—watch Westinghouse!

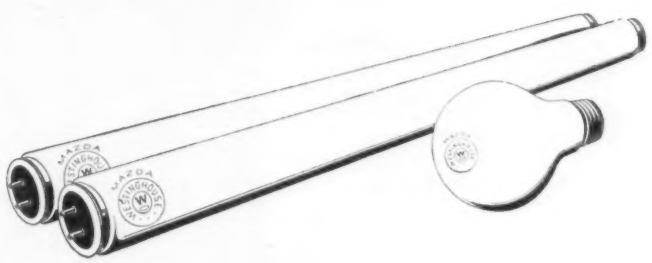
*LET'S ALL KEEP BACKING THE ATTACK . . . BUY MORE WAR BONDS!*

# FOR SEE-ABILITY

***Building today's*** *super-powerful aircraft engine calls for a high level of See-ability. For each giant 2200 horsepower motor made in this plant demands 80,000 machining operations and 50,000 inspections—130,000 vital seeing jobs where improper lighting could mean a serious, delaying error. See-ability—made possible by today's high-efficiency Westinghouse Mazda Lamps—enables workers to combine hairline accuracy with high speed operation, cuts down eye-strain and fatigue. For efficient, dependable service, recommend bright, long-lasting Westinghouse Mazda Lamps.*

*Westinghouse Electric & Manufacturing Company, Bloomfield, New Jersey.*

*Plants in 25 cities . . . offices everywhere.*



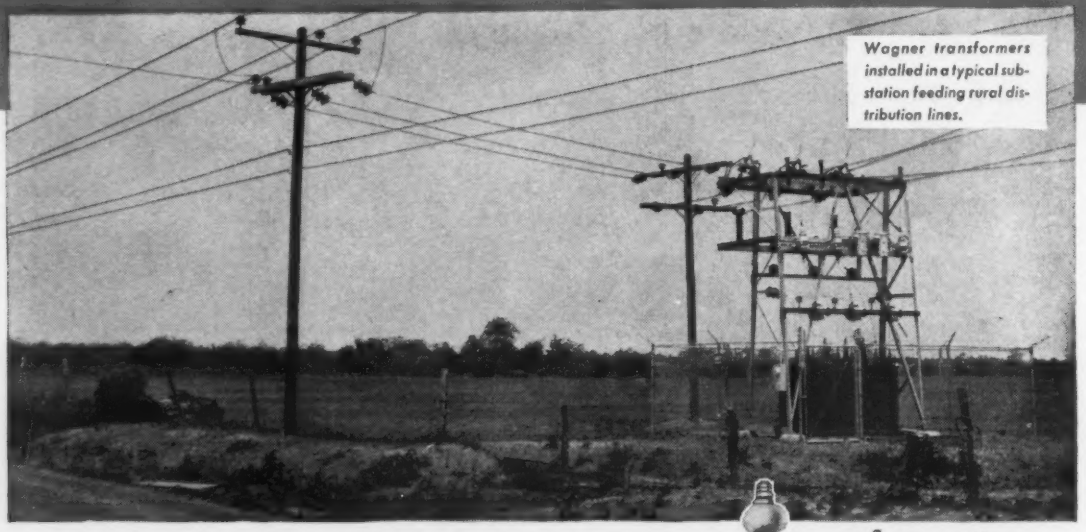
# Westinghouse

***MAZDA LAMPS FOR SEE-ABILITY***

Enjoy the Westinghouse radio program with John Charles Thomas, NBC—Sunday—2:30 p.m.—E.W.T.

# Wagner

## SUBSTATION TRANSFORMERS

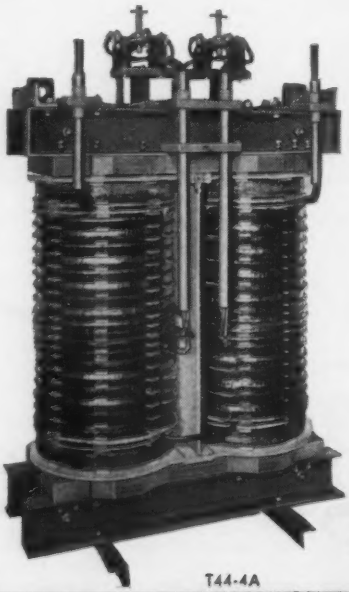


*Wagner transformers installed in a typical substation feeding rural distribution lines.*

Throughout the country many transformers, which are serving in substations feeding rural distribution systems from higher-voltage transmission lines, are overloaded due to the great increase in the number of farms being electrified.

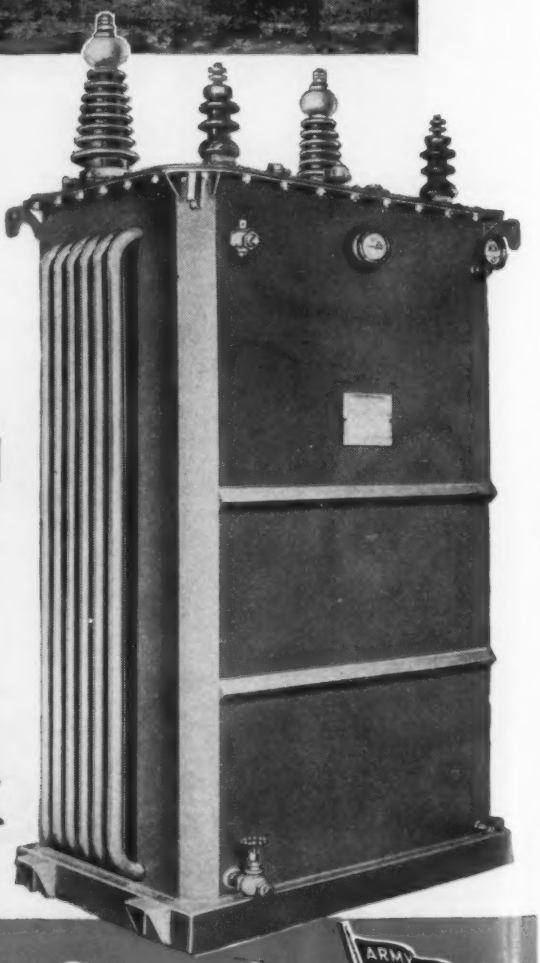
Eventually these transformers must be replaced, so if your substation transformers are overloaded you should make plans to replace them with Wagner transformers. For long life and dependability Wagner transformers are unsurpassed.

Write for Bulletins TU-180 (Distribution), and TU-181 (Power). They are yours for the asking.



T44-4A

*Typical core-type element used in Wagner substation transformers. High-voltage side shown in illustration. Wagner substation transformers are available in all standard kva sizes and voltage ratings.*



MOTORS
TRANSFORMERS
UNIT SUBSTATIONS
INDUSTRIAL BRAKES
BRAKE LINING

Wagner Electric Corporation
ESTABLISHED 1891
6381 Plymouth Avenue, St. Louis 14, Mo., U. S. A.
ELECTRICAL AND AUTOMOTIVE PRODUCTS

ARMY E NAVY
NATIONAL SECURITY AWARD

# STANDARD ENGINEERS NOTEBOOK

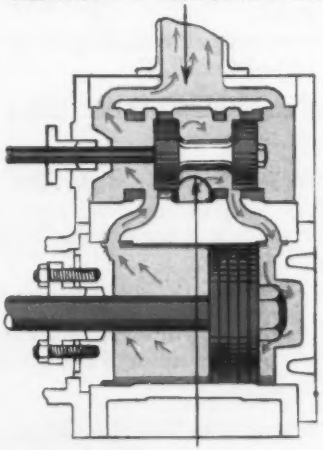
VOL. 1-E NO. 3

## Choosing the correct Steam Cylinder Oil

In choosing Steam Cylinder and Valve Oils, the following engine operating conditions should be considered:

1. Throttle steam pressure.
2. Throttle steam temperature.
3. Whether non-condensing or exhaust steam will be re-used for feed-water, refrigeration or heating. To correctly lubricate steam cylinders where temperatures range from 240°F to 800°F and pressures as high as 650 lbs., Standard of California makes 17 different grades of Calol Cylinder and Valve Oils. A handy reference guide to their use is contained in "Vital Protection for Industrial and Marine Equipment" – a free booklet available from your Standard Representative.

EXHAUST STEAM PASSAGE TO ATMOSPHERE, CONDENSER, HEATING OR ICE MANUFACTURE.



PRESSURES RANGE FROM APPROX. 75 TO 225 LBS.

WHATEVER THE CONDITION, THERE IS A PROPER, ECONOMICAL CALOL CYLINDER OIL.

## Recommendations for electric motor lubrication

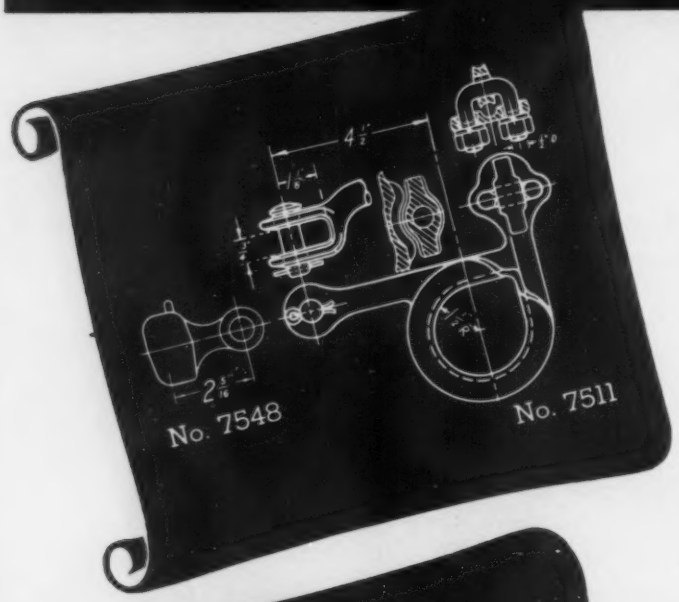
To meet the varying conditions under which electric motors operate and to properly protect the different types of electric motor bearings, Standard of California offers a long list of plant-tested lubricants. The grades of Standard oils recommended for the type bearings found in most electric motors, are in the chart below. Recommendations for other motors may be obtained by writing Standard of California, 225 Bush Street, San Francisco 20, California.

| BALL AND ROLLER BEARINGS | |
|---|---|
| **OPERATING CONDITIONS** | **LUBRICANT** |
| Normal operating conditions, speeds high and where housings are oil-tight. | Calol Engine Oil 8 or 10 |
| Ball and Roller Bearings with high end thrust; under low speeds or high temperatures | Calol Turbine Oil 15 or Calol Turbine Oil 19 |
| Ball and Roller Bearings operating under extreme pressure and temperature | Calol Diesel Engine Oil 65 or Calol Deturbo Oil 60 |
| **RING OILERS** | |
| Low Temperatures<br>Normal Temperatures<br>High Temperatures | Calol Engine Oil 8<br>Calol Engine Oil 10<br>Calol Turbine Oil 15 |
| **WICK OILERS** | |
| Bearings | Calol Engine Oil 8 or 10<br>Calol Turbine Oil 15 |

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help—make your maintenance job easier. Call your Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

STANDARD OF CALIFORNIA

# Rural & Light Trans



These are the familiar and accepted snubbing type, designed for dead-ending the lighter duty transmission and distribution lines. Low in price, they are especially adapted to rural electrification and light transmission work.

The use of forged steel parts results in a light-weight clamp with more than adequate strength. This feature, together with the short connection length, protect the conductor from the possible effect of vibration.

The ample radius of snub, smooth cable seat and long clamping keeper prevent damage to the conductor and the side opening type is easy to install and work with hot-line tools. Reversible two-groove keepers accommodate a wide range of conductor sizes.

No. 7511 (without fitting). No. 7548 (with socket eye).
For all conductors within its size range.
Min. 0.16—Max. 0.55.

Not recommended for A. C. S. R. conductors larger than No. 2-0 due to their stiffness.

Ultimate strength 10,000 lbs. Shpg. wgt. 280 lbs. per C.

No. 2104 (without fitting). No. 21048 (with socket eye).
For all conductors within its size range.
Min. 0.187—Max. 0.50.

Ultimate strength 9,000 lbs. Shpg. wgt. 200 lbs. per C.

No. 2102 (without fitting). No. 21028 (with socket).
For all conductors except A. C. S. R. within its size range.
Min. 0.128—Max. 0.375.

Ideal for the popular A series Copperweld-copper or other similar three-strand composite conductors.

Ultimate strength 7000 lbs. Shpg. wgt. 145 lbs. per C.

**BTC HI-LIN**

**THE BREWER-TITCHENER CORPORATION**

# ...mission Line Clamps

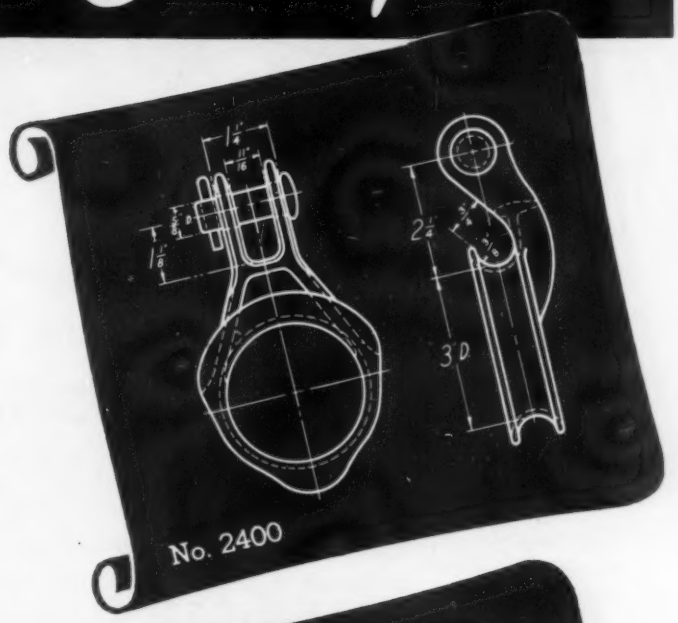
## SIDE OPENING CLEVIS THIMBLE

**For Angle and Strain Position**
**No. 2400**

Suitable for all conductors generally used on Rural and Light duty transmission and distribution lines.

Note provision for the tie winds at each side of the lower part of the thimble. May also be used as a dead end thimble. Very light in weight with more than adequate strength. Side opening allows easy installation.

Ultimate strength 9,000 lbs. Shpg. wgt. 120 lbs. per C.



No. 2400

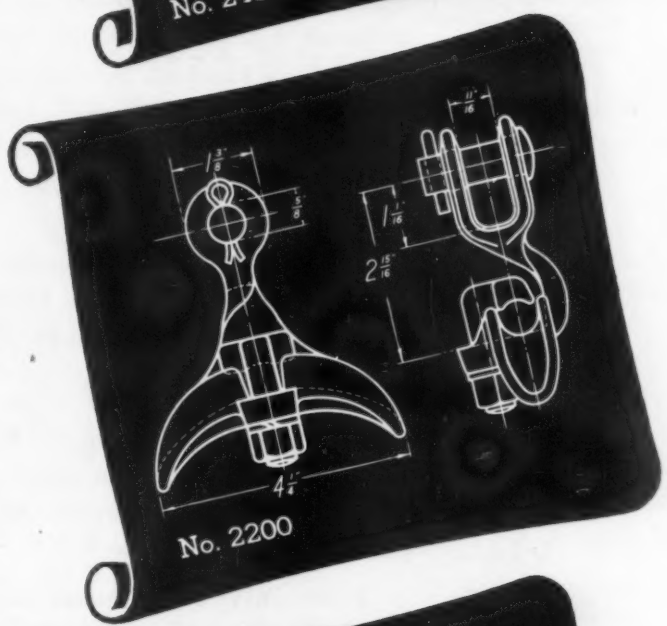
## ANGLE CLAMPS

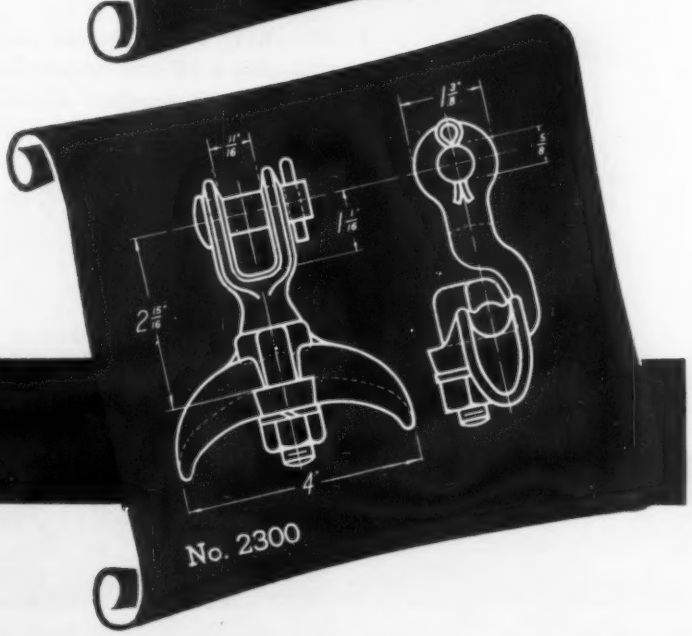
**Nos. 2200 and 2300**

Especially designed for construction having angles of 30 degrees to 120 degrees. Suitable for all commercial sizes of conductors from .12 to .60 diameter, including armor rod or ribbon.

The three inch seat contour radius meets the requirements for A. C. S. R.—Copper, Copperweld, Copper Composite and other conductors. Side opening—easy to install or work with hot-line tools. Unnecessary to remove the T-Bolt keeper during installation.

Shpg. wgt. 145 lbs. per C. Ultimate strength 5,000 lbs.


No. 2200


No. 2300

ARMY E NAVY

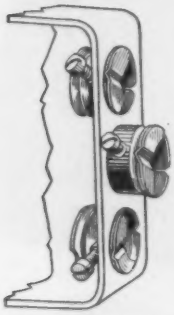
AWARDED TO CORTLAND FORGING DIVISION

## ...I HARDWARE

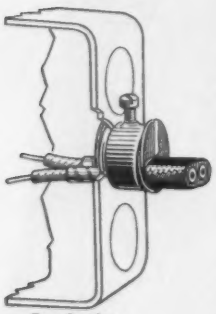
**CORTLAND, NEW YORK**

Available

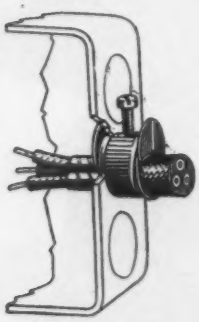
# The T&B 2020 Connector*



Inside or outside the box



For 2-wire cables



For 3-wire cables

## For Non Metallic Cable

**For old or new work. Snaps into knockout from inside or outside of outlet box. Fast. Inexpensive.**

T&B 2020 is made of sturdy, springy steel and designed solely for knockouts. Easy and quick to install. Just pinch the sides together and snap into the knockout hole inside or outside the box. No Lock-nut to tighten. Grooves hold the connector in place. No rough edges or projections. Now shove in your cable. As you turn down the screw, the clamp forces the cable against the walls of the connector and they expand, tightly gripping the knockout and protecting the cable from rough edges of the knockout. Job done.

Catalog Number 2020. For ½" K.O. Holds wide range of nonmetallic cables 14-2, 14-3, 12-2, 12-3, 10-2, 10-3 and others. Approved by Underwriters Laboratories.

*Order these 2020 Connectors from your nearby T&B Distributor through whom all T&B products are sold exclusively. His experienced services are proving invaluable to the War Production of the electrical industry.*

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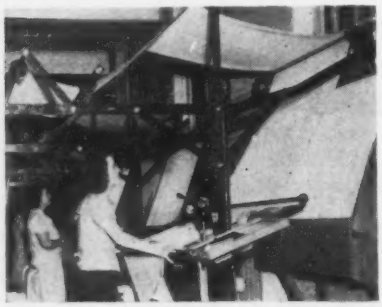
Seattle 4, Washington

* Patented

T&B THE THOMAS & BETTS CO.
INCORPORATED
manufacturers of electrical fittings since 1899
ELIZABETH 1, NEW JERSEY


### Inspection Light (611)

A fluorescent lighting device, developed for inspecting fabrics in textile mills, but said to be potentially useful for other translucent materials, has been introduced by Sylvania Electric Products, Inc. This unit consists of a wooden box four feet long, three feet wide and one foot deep, con-



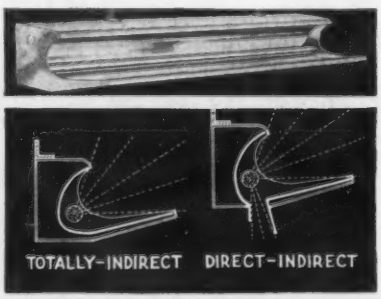
taining eight 40-watt fluorescent lamps. The face of the box is a large sheet of opal glass, which diffuses the light. Alternate lamps may be extinguished to reduce brightness, without noticeable shadows on the glass, it is claimed. Lamps and ballasts are mounted on the back of the box.

### Electronic Sorter (612)

General Electric has developed an electronic device for inspection and sorting tiny contact assemblies produced at its Schenectady works. This sorting table routes assemblies into three different channels according to height—too high, too low, or within the tolerances.

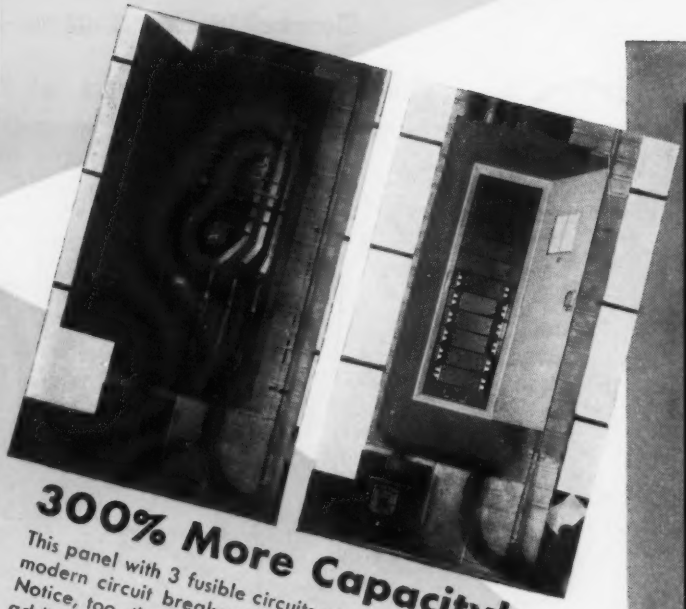
This device incorporates G-E's new electronic relay and a factory- constructed "contact head." Each assembly is fed onto a 45° slide, which is part of the contact head. About halfway down the slide, the assembly comes to a contact point located at a preset height. If it touches the point, it is oversize and, by operation of the device, is sent into a special chute. A second contact point is set at standard height less tolerance, and parts reaching this point are within acceptable limits and go into a second chute. Undersized assemblies do not touch either point and slide to a third tray.

### Germicidal Fixtures (613)




Edwin F. Guth Co. has announced germicidal fixtures for use with the new G-E UVIARC tubes. Illustrated are two types of fixtures—a totally indirect and a direct-indirect unit. According to the announcement, application of each type is dependent on individual circumstances and care and thought must be given to insure utmost safety for every installation. Available with or without priority, depending upon use.

# more capacity
## THROUGH THIS SPEEDY *Square D* CONVERSION PLAN

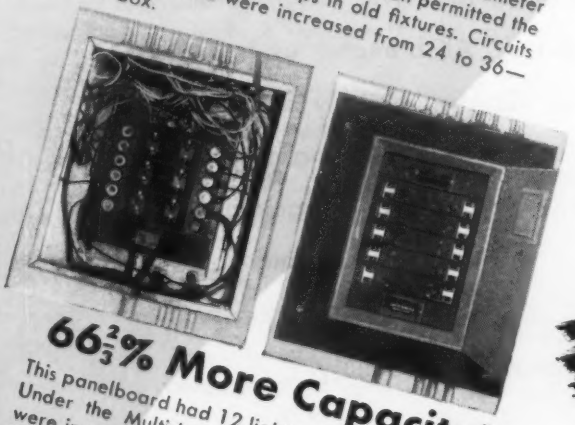


**300% More Capacity!**

This panel with 3 fusible circuits was converted to a modern circuit breaker installation with 12 circuits. Notice, too, that provision has been made for an additional 8 circuits whenever they are needed.

**50% More Capacity!**

300 watt lamps were being used. Panelboards were running hot and voltage drop was heavy. Small diameter wire and the multi-breaker Conversion Plan permitted the use of 500 and 750 watt lamps in old fixtures. Circuits in the panel illustrated were increased from 24 to 36—in the same box.



**66⅔% More Capacity!**

This panelboard had 12 lighting and power circuits. Under the Multi-breaker Conversion Plan, circuits were increased to 20 without removing the existing box or adding conduit.

Here are three typical examples of conversions which involved a minimum of installation time and labor and brought the following results:

- Increased panelboard capacities and added modern circuit breaker convenience and protection.
- Utilized existing boxes and conduit.
- Conserved power previously lost through over-loads.
- Eliminated the replacement of branch circuit switches and fuse clips due to excessive heating.

**CALL IN A SQUARE D FIELD ENGINEER**

Increasing the efficiency of your electrical distribution system will help to meet today's manpower shortages and will pay big dividends in the highly competitive and narrow-margin days ahead. A Square D Field Engineer will be glad to work with you on any conversion problem

ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

**SQUARE D COMPANY**

LOS ANGELES • DETROIT • MILWAUKEE

# MEETING TODAY'S NEEDS— PREPARING FOR TOMORROW'S

Every member of this association—comprising contractors, dealers, distributors, manufacturers and utilities—is dedicated to the task of meeting today's wartime demands for electric equipment and electric service in this area. And they're achieving excellent results in winning America's battle of production.

There'll come a time, with the dawning of "V-Day", when the march of progress toward the enjoyment of peacetime living standards—higher standards than ever before—will be resumed. All branches of the electrical industry will play a vitally important part in this program.

All-out cooperation in speeding victory NOW and preparing for the brighter days ahead, is accepted as our prime responsibility.

## NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

418 SPALDING BUILDING PORTLAND, OREGON

★ BETTER WIRING FOR BETTER LIVING ★

# Where was Mary when the lights went out?

THIS month we bring you another touching episode in the history of the Bjones family—who built a dream home, only to have it turn into a nightmare.

Upstairs, Mr. Bjones is entertaining (?) his boss—trying to make light conversation in a house as *dark and dismal* as Schickelgruber's future.

And where is Mary Bjones? Alas, she's down in the cellar fussing and fumbling with fuses—*wondering why life is just one darn fuse after another!*

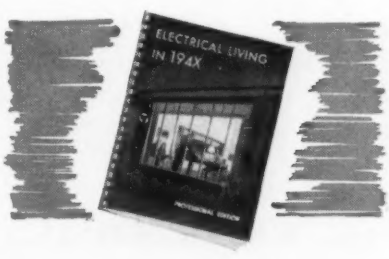
There are three reasons for the trials and tribulations of Mr. and Mrs. B . . .

***First***—their home was *inadequately wired* to carry the electrical loads imposed by modern lighting and electrical appliances.

***Second***—their home was not equipped with *modern circuit protection*—they could not restore electric service, at the flip of a switch, after the trouble was corrected.

***Third***—their home did not have modern circuit protection—*conveniently located*—they had to go to the "hard to get to" protective device in the cellar.

We have prepared a new book—"Electrical Living in 194X"—that will help you explain the urgent need for *better wiring* and *modern protection* to present and future home owners.




"Electrical Living in 194X" tells all about increased electrical loads in future homes—modern circuit protection—lighting and lighting controls—entrance equipment and distribution panels.

*This big, profusely illustrated, 64-page book is free!* Get your copy now, by writing Better Homes Department (EP-64), Westinghouse Electric & Manufacturing Company, Pittsburgh 30, Pa.

**BETTER HOMES DEPARTMENT**

***Six Point Advisory Service***

. . . offers free technical advice on the selection, application, and arrangement of fixed electrical equipment in 194X homes—dimensions and clearances, for proper installation and easy access for servicing—placing of lighting outlets and controls—location and size of wiring, water supply, and drainage lines.

Send your electrical problems to the Westinghouse Better Homes Department. Our housing specialists will give you authoritative information, promptly.

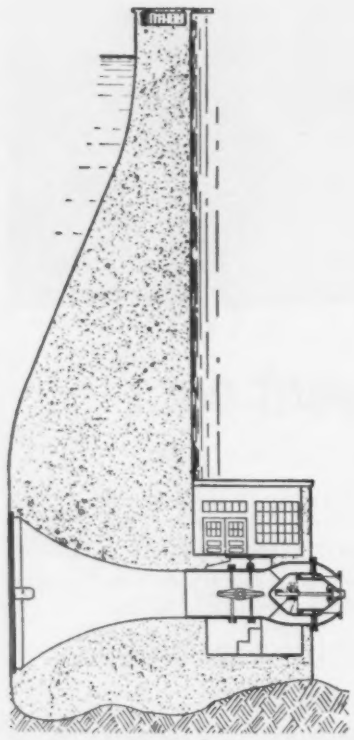
Westinghouse

***Plants in 25 Cities — Offices Everywhere***

**WESTINGHOUSE PRESENTS** ***John Charles Thomas, Sunday, 2:30 p.m., E.W.T., NBC. "Top of the Evening", Monday, Wednesday, Friday, 10:15 p.m., E.W.T., Blue Network***

# Positive Water-Flow Control

## *with* LARNER-JOHNSON VALVES



Typical arrangement of Larner-Johnson valve in arch-type dam.

## Built by PELTON WATER WHEEL COMPANY for Pipeline Shutoff, Throttling or Free Discharge.

Larner-Johnson valves are widely used for water-discharge regulation at hydro-electric and water-storage dams and at the end of penstocks.

Their design provides easy hand operation or remote electrical control of all sizes without cumbersome control rods because the plunger is water balanced at all times by the pipe-line pressure present in the body of the valve. Being streamlined, Larner-Johnson valves provide smooth flow at any given opening without change of water direction and thus eliminate vibration.

For many years Pelton has designed and built Larner-Johnson valves for pipeline shutoff, throttling and free-discharge service. Ask for full details.

**THE PELTON WATER WHEEL COMPANY**

HYDRAULIC ENGINEERS

2929 Nineteenth Street San Francisco,10

**Other Sales Offices in the United States:**

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**Baldwin Locomotive Works, Paschall P. O., Philadelphia 42, Pa.**

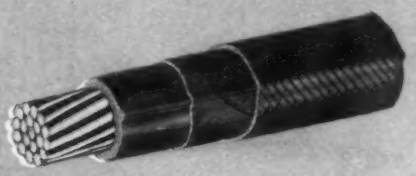
BLW THE BALDWIN GROUP

PELTON

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

# 1844 - One Hundred Years of Telegraphy - 1944

## from the needs of telegraphy Okonite wire and cable research was born



JOHN HAVEN CHEEVER, pioneer rubber manufacturer, was started on the great research job that ended in his founding The Okonite Company when his friend Samuel F. B. Morse suggested the need for a rubber insulation that would protect telegraph wires in damp places.

Cheever succeeded and Okonite's first major work was in supplying covered telegraph wire that helped our fast expanding nation get its messages through, despite trying conditions of heat and moisture.

So it has been for 66 years. As insulated wires and cables were needed for new developments, Okonite research supplied them; frequently our investigations have indicated far reaching possibilities in cable insulations and cable construction which have found valuable applications. In a number of instances we have developed new synthetic compounds which time has proved are superior in many respects to those made from natural materials.

Okonite research is not an abstract, theoretical venture. It's a down to earth, practical branch of our business. Its results are of benefit to — and available to — all our customers. It's both general, in a broad sense, and very specific in its search for perfection and discovery in individual fields.

REPORT
OKONITE CABLE

A report, made over 50 years ago, on Okonite Cables by English scientists who found Okonite Insulation "excellent".

For a discussion of Okonite wire and cable research, with concrete examples, write for Bulletin OK-1005A, a well illustrated 36 page booklet.

The Okonite Company, Passaic, New Jersey.

# OKONITE

## Insulated Wires and Cables

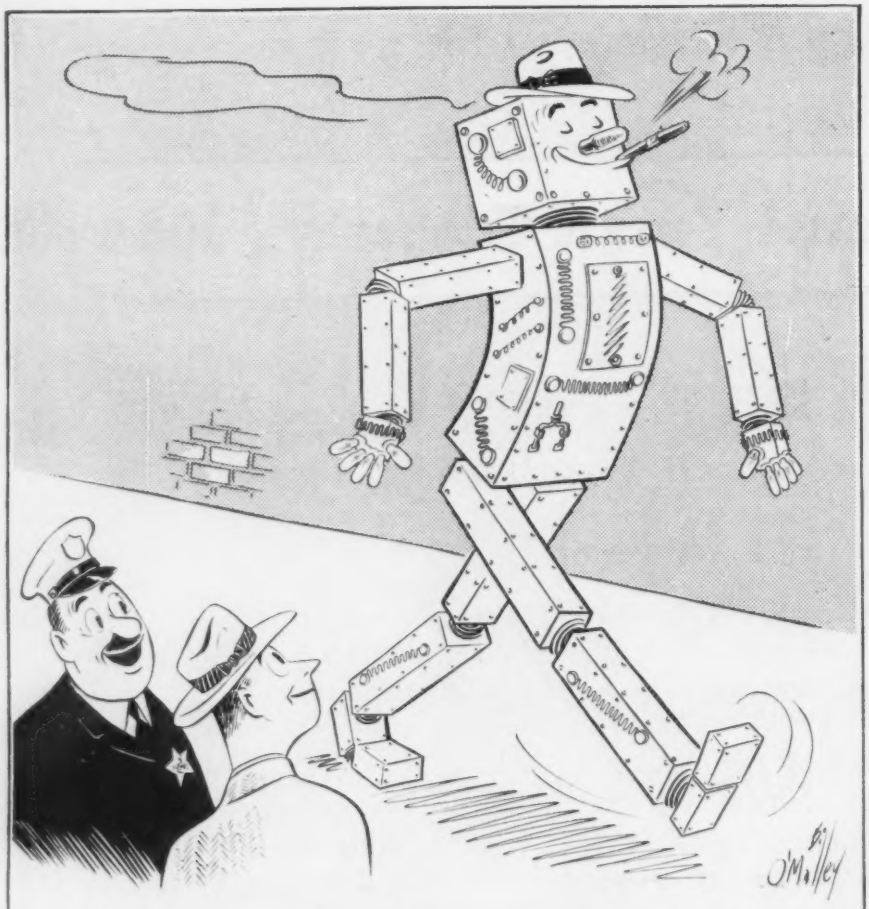
**THE DERIVATION OF OKONITE**

**OK** — *A signal flashed by telegraphers indicating message got through.*

**O** — *To aid in pronunciation.*

**NITE** — *A suffix used in the early days (as in "vulcanite") to signify "insulation".*

3068



"They say he gets his parts from the Leo. J. Meyberg Co."

Putting a metallic finger on most any item of electronic or electric supplies is no enigma to Robert the Robot. He merely tunes in to the Leo J. Meyberg Co. in San Francisco or Los Angeles.

And so should you.

We carry the lines of over two hundred nationally known manufacturers, in both the electronic and electric supply fields. Our customers throughout California know where to turn for a ½ watt resistor —or a complete commercial sound system, engineered by experts. There's a very sizeable reason for this: our stocks of electronic and electric supplies are the largest in the West. And we try to be Johnny-on-the-spot when it comes to filling orders.

That's why so many people say *"Call Meyberg First."*

LEO J. MEYBERG CO.
Incorporated
70 Tenth St., SAN FRANCISCO, 3 TELEPHONE UN 1212
2027 S. Figueroa St., LOS ANGELES, 7 TELEPHONE PR 6011
MOST COMPREHENSIVE INDUSTRIAL ELECTRIC AND ELECTRONIC STOCKS IN THE WEST

# BULLETINS

*data books, etc.*

## Rectifier Maintenance (614)

In a reprint from the manual "How to Maintain Electric Equipment," General Electric tells how to take care of rectifiers. Contents include general information, preventive maintenance schedule, how to detect misfires, how to detect a faulty regulator, how to remove ignitor, how to clean tanks, corrosion prevention in cooling systems and a trouble-shooting chart.

## Condensate Sampling (615)

Of interest to those concerned with preventing contaminated condensate from reaching boilers and prime movers, is the Leeds & Northrup booklet, "Micromax Condensate —Purity Instruments for the Steam Plant." This bulletin describes how condensate is sampled continuously by means of a conductivity cell and its purity indicated and recorded automatically.

## Welder Control (616)

Weltronic Co. lists specifications and features of its synchronous resistance welder control, Model No. 75-51-50, in a two-page folder recently released. According to the manufacturer, this model was designed to permit control of operations on spot welders using air or hydraulically actuated electrodes, with solenoid operated valves.

## Constant Level Oilers (617)

Trico Fuse Mfg. Co. has prepared new data sheets on constant level oilers, describing its automatically controlled visible oiling method for ring or ball bearings, shafts, gear and pump housings.

## Electric Furnace (618)

Thermo Electric Mfg. Co. has issued a folder describing its Temco electric furnace for heat treating of small parts, tools, dies, gears etc. and for testing and development work.

## Toolite (619)

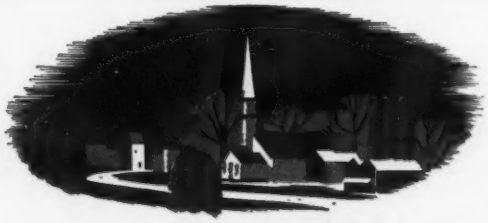
Adhere Inc. has a new folder on "Toolite," a thermosetting phenolic plastic for casting tools, dies and fixtures. Properties, characteristics and procedures are explained.

## Catalogue (620)

General Detroit Corp. is offering a "Buyers' Encyclopedia" of items in the industrial maintenance, safety and fire protection fields.

## Amplidyne (621

An eight-page folder prepared by General Electric Co. tells how the amplidyne improves electric shovel operation. Illustrated.



# JUST SUPPOSE!

## by Barbara Brown

### Olney High School, Philadelphia, Pa.

*Note: Several weeks ago, the United States Treasury Department and the Columbia Scholastic Press Association sponsored an editorial contest for the nation's high school students. Subject: War Bonds. Winner: 15-year-old Barbara Brown, a Philadelphia high school junior. In the interests of helping the Fifth War Loan Drive, now in progress, we are proud to print here the stirring message written by Miss Brown.*

SUPPOSE *there were no tomorrows?* . . . Think about it for just a minute . . . No tomorrow for you, or your kid sister at home—or the brother who left for the Army yesterday. Did you ever think that we, who have had so few yesterdays, may have no tomorrows?

It *has* happened, you know. To Jack Feldman, and to Bob Ernest—and to fifteen other boys who sat in our classes just last year . . .

They will have no tomorrows. They died before they ever had a try at living . . . so that we here at home might have our chance.

There are millions who were asked to give up more than a double feature at the Earle . . . or a spiffy new pair of pumps for next week's formal. A soda is a pretty insignificant sacrifice, when you think of things like—

The kids in Russia, who live on a few ounces of cereal a day. *They've never seen an ice-cream soda.*

The Polish boys and girls, who would be in school right now, just as we are . . . *if there were any schools left.*

The French youths who've never had a hamburger when they were out on a date—or any other time, for that matter. They are old, very old . . . *older than you and I will ever be. . .*

There are millions of them . . . in Norway . . . Holland . . . Denmark . . . Belgium . . . They would stare in amazement if they could be here to see—

A jalopy painted bright yellow. "The Tin You Love To Touch" printed in big, green letters on the back.

A high school senior, uncomfortable in his first tuxedo . . . calling for his date, looking nervous.

Millions of things that we take for granted . . .

There is such a feeling of permanency in our tight little world. We'll go to school with the gang, today . . . and tomorrow . . .

BUT, WHAT IF THERE WERE NO TOMORROWS? There's only one way to be sure, you know—

*Buy War Bonds* . . . That's a simple little phrase. It's the American way of saying what we mean in a few direct words. *Buy War Bonds.*

Yes—you and everybody must buy War Bonds. We've *got to* buy more and more and more of 'em. Just get the idea into your head that your $18.75 might—just *might* end the war one-fifth of a second sooner. That maybe, in that one-fifth of a second, the boy next door could be on the receiving end of a bullet . . . Then you'll know that it's worth any small sacrifice you have to make!

We've got to keep on plugging, saving, convincing. Giving our pin money . . .

Tell everybody—sell everybody! We can't take no for an answer . . . Because we are buying *tomorrow—and tomorrow—and tomorrow.*

ARMY E NAVY M★★★

SPANG-CHALFANT

Division of The National Supply Company

Executive Offices:

Grant Building, Pittsburgh, Pa.

District Offices and Sales Representatives in Principal Cities

★ KEEP BUYING WAR BONDS ★

# THREE OF A KIND

A good hand when they are Aces; and that's what these are—Aces, all—our old members, our new members, and our service members.

In the first group are some 1700 men and women in the industry who have been members of the P.C.E.A. for from one year to twenty-seven years—yes, there are those who have an unbroken membership since the organization was created in 1917. To all of them we express appreciation for their loyalty.

In the second group are several hundred who this year joined the Association for the first time. To them, a hearty welcome and the urge that they use their membership fully—by attending meetings when possible; and by calling at or writing to the Association offices for information that will benefit them in their work.

In the third group are numerous members who, though now widely scattered over the world in military service, have kept their affiliation as a means of maintaining contact with their civilian life and friends. To them, greetings, the best of luck, and an early return.

Almost 2200 members in 1944—an increase of more than 5% over 1943—that is the creditable record of your Association in these trying times. It is evidence of the growing realization that a united industry can face the future with better prospects for each individual in it.

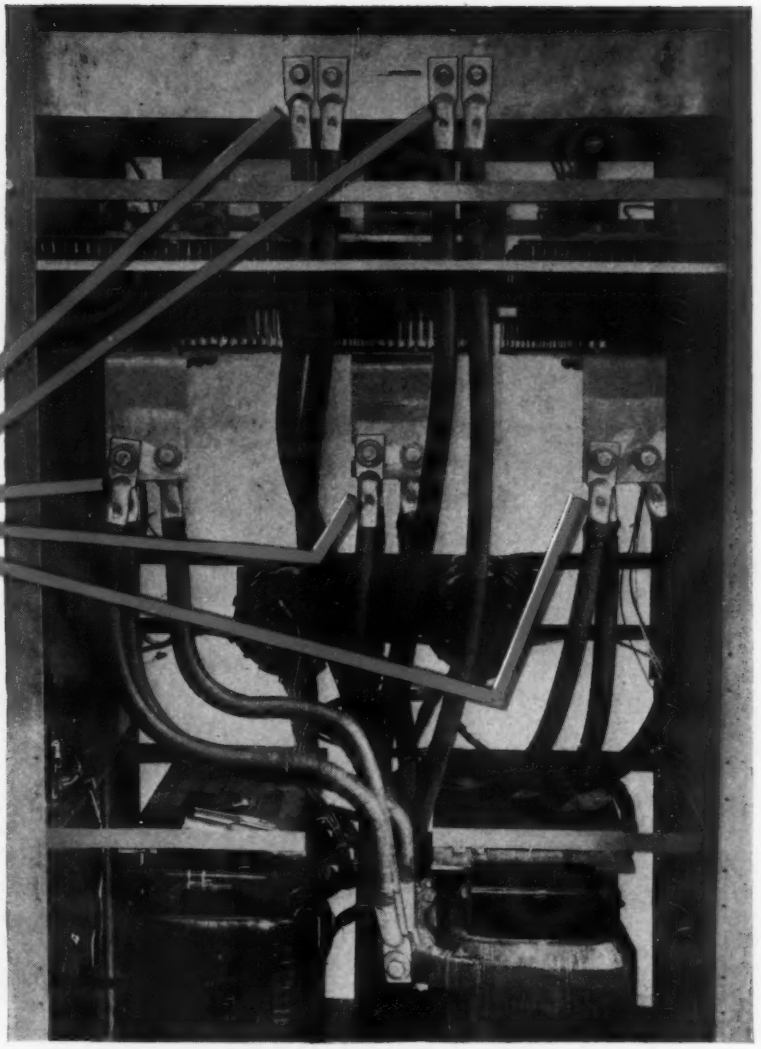
If you have a friend who is not now a member invite him to join with the industry's leaders in the industry's organization.

**PACIFIC COAST ELECTRICAL ASSOCIATION, INC.**

601 West Fifth Street
Los Angeles 13

447 Sutter Street
San Francisco 8

# Hydent CONNECTORS



Connecting #22 wire or 2000 mcm cable . . . you can do it with one-piece HYDENT Connectors, using the simple Burndy Indenting Tools which range from small hand HYTOOLS (pliers), to hydraulic HYPRESSES.

*The Modern Way*

## . . . to make permanent electrical connections *permanent!*

On circuits everywhere, you now see modern Burndy HYDENT (Indent Type) connections like those above . . . in place of old-fashioned connections made by methods which were time-consuming and uncertain.

The Indent connection has been widely adopted because the indenting principle removes all uncertainty over the strength and permanency of the connection. Further, the HYDENT connectors used are of *one-piece, pure copper* construction . . . assuring highest electrical conductivity. And they are installed in a *fraction of the time* . . . another feature industry likes, too.

Pioneered and proved by utility engineers, the HYDENT connection has been a significant aid to our war effort . . . and will contribute materially to product and production efficiency in the days to come. Bulletin on HYDENT Connectors gladly sent on request.

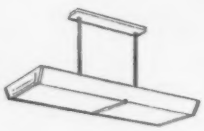
**BURNDY ENGINEERING CO., INC., 107 Bruckner Boulevard, New York 54, N. Y.**
**IN CANADA: Canadian Line Materials, Limited, Toronto 13**

**FOUR**

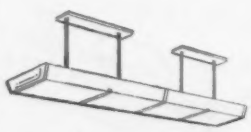
**FLEXIBLE MOUNTINGS**

As individual units, mounted flush with the ceiling.

For continuous strip applications, mounted flush with the ceiling.



As individual units, with twin-stem hangers.



For continuous strip applications, with twin-stem hangers.

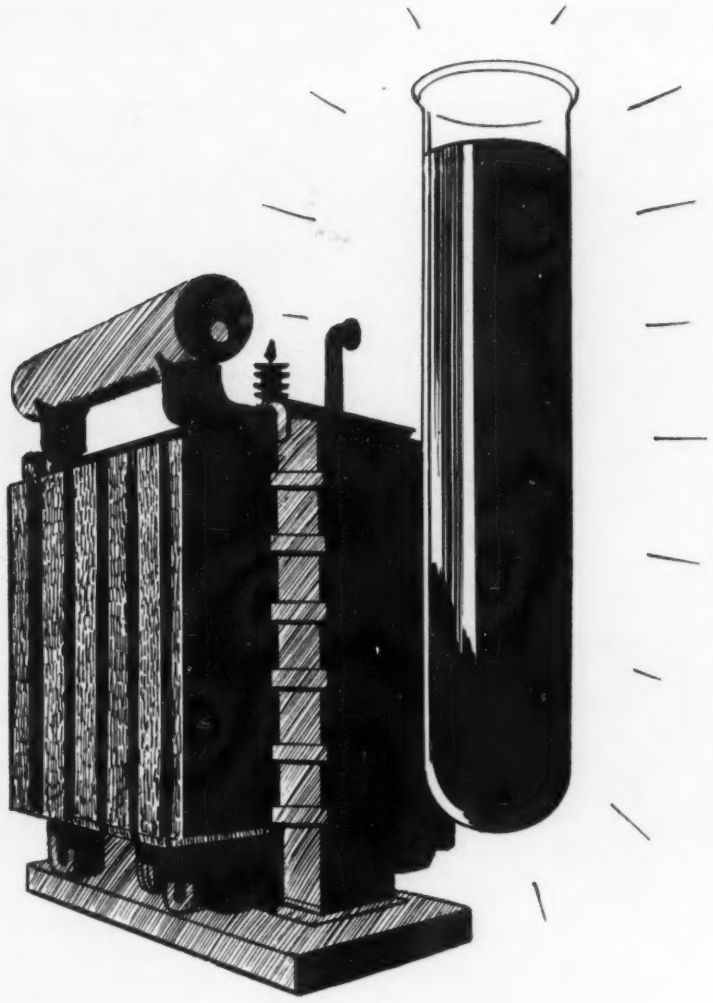
The new line of Westinghouse Fluorescent Luminaires is available now for essential war applications. These handsome fixtures provide high level, glareless lighting over a wide range of intensities. Their advanced design offers many practical advantages . . . easy installation . . . simple maintenance . . . built-to-last construction.

For example, lamps can be replaced without removing glassware. Starters and ballasts are readily accessible. All glass panels can be removed for cleaning without the use of tools.

This new line of improved luminaires is available on priority order now from 117 Westinghouse Electric Supply Company offices and Independent Westinghouse Lighting Distributors. Get full details—ask for B-3332.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



# For full protection of your transformers

For a tough, stable oil that will guard your transformers from the dual dangers of heat and electrical losses for exceptionally long periods of time, investigate Red Line Transformer Oil.

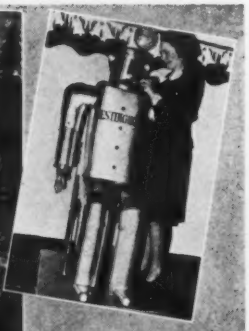
This Union Oil product possesses outstanding oxidation stability and sufficient fluidity to allow a rapid transfer of heat at all times. Its high flash point means extra insurance against fire from spark-overs.

It won't break down from transformer heat or form those deposits of sludge which retard circulation and cause temperatures to mount to the danger point. It has adequate dielectric strength to prevent power loss through lack of insulation.

Red Line Transformer Oil was developed through research with the principal manufacturers of transformers. It has been given thorough testing under all kinds of operating conditions. You can get a supply of this outstanding product by phoning your local Union Oil Resident Manager, or by writing to Union Oil Company, 617 W. 7th Street, Los Angeles 14, California.

**RED LINE**
**TRANSFORMER OIL**

*Another*
**UNION OIL**
*Success-Tested Product*



# Do you Know?

## WHAT IS THE BUREAU OF RADIO AND ELECTRICAL APPLIANCES OF SAN DIEGO COUNTY?

### WHAT IT HAS DONE? WHAT IT IS PLANNING TO DO FOR YOU?

The Bureau is your electrical dealer, your appliance repairman "just around the corner," the electrical distributor, the manufacturer's representative and the local utility. Back in 1932 a small group of these men decided that together they could do a better job of bringing the benefits of electrical things to you and so the Bureau was formed. It's first undertaking was the original Electrical Show on Broadway Pier which 30,000 San Diegans attended. That was twelve years ago.

### SHOW SPONSORSHIP

Since then the Bureau has grown to a membership of 138 businesses which normally distribute, sell or service appliances in San Diego County. Under the energetic leadership of its secretary-manager, J. Clark Chamberlain, the Bureau has staged sixteen free Electrical Shows and Spring Fairs to which over one million people came to see the very latest developments in appliances and electrically operated equipment. Here, the tremendous changes and advancements made by the electrical industry in the last decade were first shown to the people of our county.

Bureau of Radio and Electrical Appliances

San Diego County

An Open Letter to the Present and Future Owners of Electrical Appliances

You must be greatly confused as to the outlook for obtaining such things as Washers, Refrigerators, Electric Irons and other home appliances of essential nature. Frankly, we too have been confused over the conflicting announcements that from time to time have indicated manufacturers might soon be permitted to resume production.

But close as we are to the appliance manufacturers, many of whom are represented on our membership, we do not know of any definite action taken as far by any Governmental agency which can result in early production or delivery of the items mentioned.

However, we can assure you that steps have already been taken by our Bureau to make certain San Diego County Dealers will have those critically needed appliances as soon as they are manufactured, and in quantities that will fairly represent our proportionate share of the production.

We still hope that early Governmental action may be taken to clear up the present confusing appliance outlook. I've assume you have been following recent press and radio releases regarding Electric Irons! — but this does not warrant expectation on your part of getting a Washer, Refrigerator or Electric Iron this summer.

Instead, we strongly urge the greatest care in preserving whatever home appliances and equipment you now have. And despite our many difficulties with manpower shortages, lack of certain repair materials and the common problems of business today, we pledge the combined efforts of our Membership in continuing to keep your essential appliances in operation, to the best of our ability.

Sincerely yours,

PAUL A. DU PONT, President

J. CLARK CHAMBERLAIN, Sec'y-Mgr.

It was the Bureau that staged the "Coming Out Party" when automatic electric table appliances first appeared, put on the "Amateur Ironers Institute" at which 3010 men and women actually took individual demonstrations on the automatic ironers. It was the Bureau that sponsored the Palace of Electricity at the 1936 San Diego Exposition, and staged a number of "Chilled Food Institutes" and Cooking Schools.

### CIVIC ACTIVITIES

But the staging of shows and demonstrations has not been the only civic contribution of the Bureau. This organization sponsored the present sub-standard electrical appliance ordinance which protects you against unsafe equipment. The Bureau instigated the establishment of the city Radio Interference Department to improve local radio reception. Some 250,000 free Radio Logs were published and distributed by the Bureau during the five years immediately preceding the war. And it is this organization that has sponsored year around advertising campaigns to acquaint the public with the advantages of labor-saving appliances.

Even though the war has temporarily put an end to appliance manufacture, and the annual "Electrical Shows" and "Spring Fairs," the Bureau is more active today than ever. Through its members it is distributing 75,000 booklets on the Use, Care and Repair of Appliances. In the face of shrinking manpower and scarce materials, it has mustered its repair services to keep several hundred thousand of San Diego's electrical appliances "on the job." Through these pages, the Bureau's advertising is endeavoring to show you the best way to keep your electrical appliances operating until "that day"— when new appliances will again roll off assembly lines – when the Bureau will again invite you to attend its next big "Free Electrical Show"!

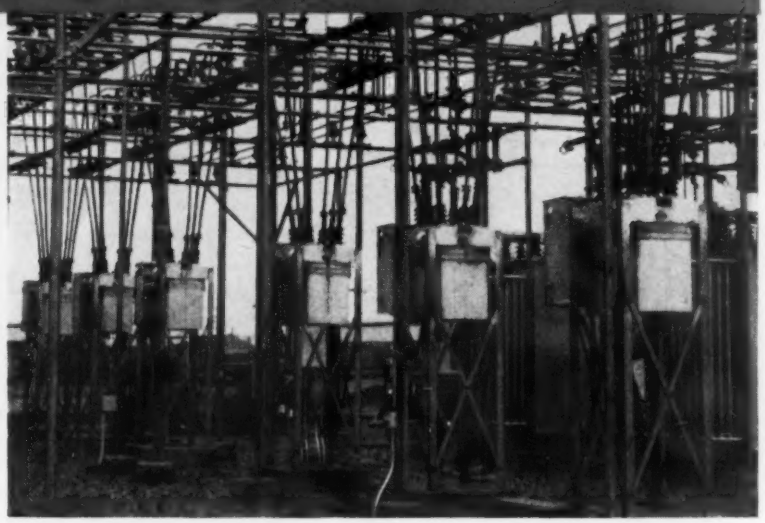
BETTER CARE LESS REPAIR

**BUREAU OF RADIO AND ELECTRICAL APPLIANCES**

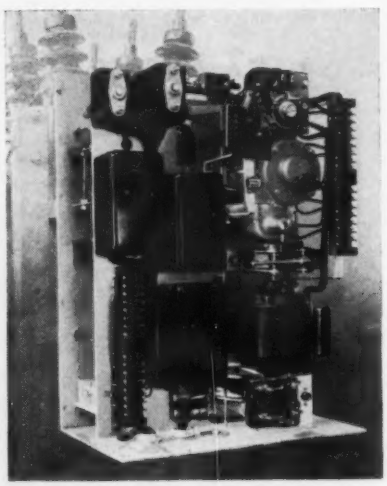
# *Here's a* MORE RELIABLE 7.5-kv or 15-kv BREAKER BECAUSE PACIFIC ELECTRIC

*Gives you their famous*

## SPRING-OPERATED MOTOR MECHANISM



Type AKE-25, 7.5-kv., 400 and 600 amps; and Type AKE-40, 15-kv., 600 amps; 50,000-kva.



The Type MJ-1 Motor Mechanism is factory mounted on the breaker frame. Can be arranged for automatic reclosing by adding reclosing relay. Our Type DM-1 Control offers fast, reliable, automatic opening with manual closing.

## Saves Critical Materials at Installation; Saves Installation Time, Shipped Assembled

You get positive protection from the most severe faults with this Pacific Electric Breaker equipped with the Spring-Operated Motor Mechanism.

The motor, operating on A.C. or D.C., as desired, automatically winds the strong operating spring which stores energy for fast opening and reclosing. You get operations on any number of transient faults.

Having no rectifiers, the operating-power circuit is simplified and you save critical materials. You save time at installation because the Motor Mechanism is factory mounted on the breaker frame, tested and shipped assembled.

At scores of installations this breaker's simple design, its sturdy construction, its fast arc extinguishment, assure reliability, safety and rock-bottom maintenance.

Ask for full details about Pacific Electric Breakers with the Spring-Operated Motor Mechanism. Then you will know that here is positive fault protection.

C. H. Cutter, 1015 Securities Bldg., Seattle 1, Wash.
G. B. Kirkwood, 437 S. Hill St., Los Angeles 13, Calif.
J. E. Redmond Co., 448 W. Madison Ave., Phoenix, Ariz.
Myron Swendsen, P. O. Box 156, Boise, Idaho
R. Ackerman, 318 Dooly Block, Salt Lake City 1, Utah
Northwest Supply Co., 909 East 2nd St., Butte, Montana

Other Representatives in Principal Cities

## Pacific Electric Mfg. Corporation

5815 THIRD ST., SAN FRANCISCO, 24, CALIF. DUNES HIGHWAY, GARY, INDIANA

# To Protect Electrical Apparatus

## FOR UNINTERRUPTED WAR PRODUCTION

**PARTIAL LIST OF CONTENTS**

ARMATURE WEDGES
ASBESTOS PAPER
COMPOSITE SLOT INSULATION
CORDS
CORE SOLDER
COTTON SLEEVINGS
FILLING COMPOUNDS
GLYPTALS
INSULATING PAPER (GE1874)
MICA COMPOSITE INSULATION
MICA FLEXIBLE PLATE
MICA HEATER PLATE
MICA MOULDING PLATE
MICA SEGMENT PLATE
MICA TAPES
MICA TUBING (round)
MICA WASHERS
NON-ELASTIC WEBBINGS
PAINTS
PRESSBOARD
RAWHIDE FIBER
RUBBER CEMENT
SEALING COMPOUNDS
SOLDERING FLUIDS
SOLDERING FLUX
SOLDERING PASTE
STAY BINDING
STICKERS
SURGICAL WEBBING
TAPES
THINNERS
TWINES
VARNISHED COTTON CLOTH
VARNISHED DRILL AND DUCK
VARNISHED PAPER
VARNISHED TUBING
VARNISHES
VULCANIZED FIBER RODS (round)
VULCANIZED FIBER SHEETS
VULCANIZED FIBER TUBING (round)

Keeping electrical apparatus on the job for uninterrupted war production is largely a matter of protecting the equipment with the right insulating materials. The What, Where, When and Why of electrical insulation is contained in this new G-E catalog. It will prove invaluable as a guide in selecting the right insulating material for every job. A copy is available from any of our offices.

**GENERAL ELECTRIC SUPPLY CORPORATION**

*A national organization serving the West with conveniently located Offices and Warehouses*

SAN FRANCISCO, OAKLAND, SACRAMENTO, FRESNO, LOS ANGELES AND SAN DIEGO, CALIFORNIA
SEATTLE AND SPOKANE, WASHINGTON • PORTLAND, OREGON
PHOENIX, ARIZONA

# Your linemen can save you money...

# with Bethlehem's new serving tool

*Patents Pending*

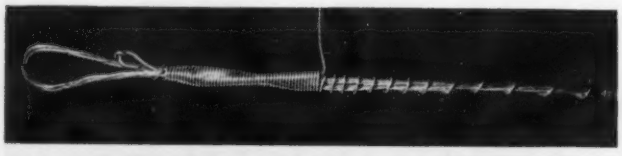
Here's a new, speedy, inexpensive way to make dead ends on bethanized strand and Ruralductor. With Bethlehem's handy serving tool, linemen can quickly form a tightly-wound dead end connection that will hold above the useful strength of the strand.

Consider these advantages of the new Bethlehem "dead end coil" method of making dependable connections:

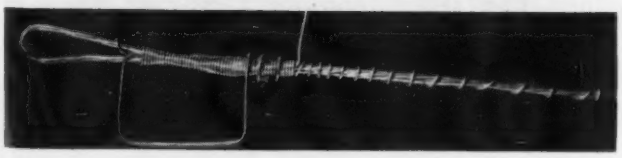
1. The tool maintains controlled tension, with minimum displacement of the bethanized coating. This is because the electrolytically-applied bethanized coating is tight, ductile and uniform. This technique is recommended for use only with bethanized strand or Ruralductor, since the holding power of this dead end is not always reliable with other coatings.

2. Any lineman can quickly learn to use the serving tool. He simply takes an inexpensive coil of 11-gauge bethanized dead end wire, winds 50 turns with the tool—and that's that. There are numerous applications for this dead end—two of them are shown below. The tool will serve bethanized strand of any grade, in Class A, B and C coatings, without materially impairing corrosion resistance.

Plan to use this money-saving combination—bethanized strand or Ruralductor and the new Bethlehem serving tool—for your next installation. You can obtain full information from the nearest Bethlehem office, or by writing direct to Bethlehem Steel Company, Bethlehem, Pa.



**Vibration-Dampening Dead-End Assembly**—For three-strand Ruralductor, with jumper wire firmly secured.

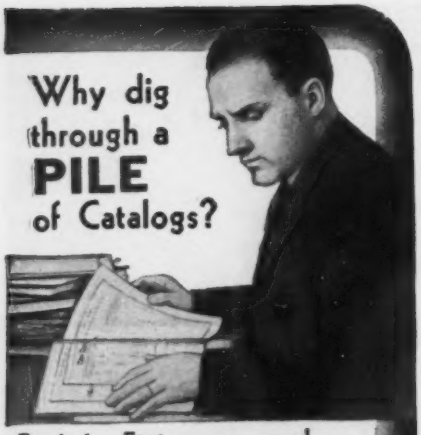


**Dead-End Assembly with Stirrup for Hot Line Clamp**—The jumper wire is shaped into a loop, to take the hot line clamp.

**One way the serving tool was tested**

A number of completely inexperienced men made serves, after watching *one* demonstration of the new serving tool. In subsequent tests, all specimens held beyond the useful strength of the strand.

★ BETHLEHEM STEEL ★

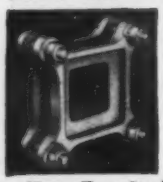



Find the Fitting you need—quickly—in the COMPLETE line

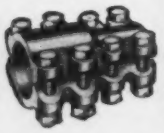
If you have a Penn-Union Catalog, you can instantly find practically every good type of conductor fitting. These few can only suggest the variety:

**Universal** Clamps to take a large range of conductor sizes; with 1, 2, 3, 4 or more bolts.

**L-M Elbows**, with compression units giving a dependable grip on both conductors. Also Straight Connectors and Tees with same contact units.



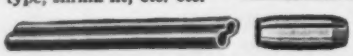
**Bus Bar Clamps** for installation without drilling bus. Single and multiple. Also bus supports — various types.



**Clamp Type Straight Connectors and Reducers, Elbows, Tees, Terminals, Stud Connectors, etc.**

**Jack-Knife** connectors for simple and easy disconnection of motor leads, etc. Spring action — self locking.

**Vi-Tite Terminals** for quick installation and easy taping. Also sleeve type terminals, screw type, shrink fit, etc. etc.



**Splicing Sleeves, Figure 8 and Oval,** seamless tubing—also split tinned sleeves. High conductivity copper; close dimensions.

**KENNETH ANDERSON CO.**
334 East 4th St., Los Angeles

**F. M. NICHOLAS CO.**
1123 Harrison St., San Francisco

**NORTHWESTERN AGENCIES**
2411 First Ave., Seattle, Washington
Penn-Union Electric Corp., Erie, Pa.

**PENN-UNION**
Conductor Fittings


## Thermocouple Data (622)

Wheelco Instruments Co. has prepared a new edition of its thermocouple data book and catalogue. The 36-page booklet describes the products, gives prices, recommendations for selection and use, and suggested substitutes for restricted materials. It also carries WPB's conservation order L-134, as amended Nov. 17, 1943, temperature conversion tables, millivolt tables and tables on pipe and wire sizes, decimal equivalents and wire resistances.

## Frozen Foods (623)

General Electric Co. is still offering its Consumers Institute booklet on frozen foods, which has had a wide circulation in the past few months. According to the company, the booklet was prepared to present in as simple form as possible essential information for selection, preparation, packaging, storage and use of foods frozen in locker plants or homes.

## Connectors (624)

Cannon laboratory and switchboard connectors are described in a 12-page bulletin. Presented are surface and sub-mounting plugs and receptacles, straight cord plugs and receptacles, switching plugs and experimental switchboards. The series is for use in laboratory and switchboard applications of experimental laboratories.

## Automatic Control (625)

A four-page pamphlet describes Callite Tungsten Corp.'s Calliflex Bi-Metal for use as a temperature responsive element in automatic control. This material is available in five types according to temperature requirements, including low, medium, special medium, high and rust-resisting.

## Capacitors (626)

Solar Mfg. Corp. has a booklet on capacitors in which it includes a layman's primer of the product and 16 pages of Signal Corps photographs showing scenes at the front.

## Resistance Welding (627)

Resistance welding is the subject of a 28-page publication released by General Electric Co. The material was prepared by R. T. Gillette, G-E resistance welding engineer, and is reprinted, with changes, from a series of articles which appeared in 1942 and 1943 issues of "Industry and Welding."

## Stage Switchboards (628)

Hub Electric Corp. is distributing a publication containing information on stage switchboards. The booklet presents the Hub-Regulite system of remote lighting control and "dial selector" type cross connecting panels. It discusses both manually operated and remote control stage switchboards, ranging from the one-scene preset type, suitable for community houses and school auditoriums, to large multi-scene boards. Illustrated.

## Ballasts (629)

Jefferson Electric Co. describes its ballasts for fluorescent lamps in a 12-page bulletin. The line includes single-, two-, three- and four-lamp ballasts and bottom lead ballasts. Data given in the bulletin include dimensions, wiring diagrams for ballasts and lamp switches, as well as comparative mounting dimensions.

## Electric Drill (630)

Titled, "Tools to Build the World of Tomorrow," a booklet covering the development, specifications and features of the Thor plastic-housed portable electric drill has been released by Independent Pneumatic Tool Co.

## Light and Safety (631)

The importance of light to safety is portrayed in a folder produced by Holophane Co. Called "Architexts," the leaflet presents statistics and pictures to emphasize its point.

## Binocular Microscope (632)

George Scherr Co. has issued a folder on the Spencer binocular microscope for finish control. Construction features, table magnifications and other information are given.

## Pyranol Transformers (633)

Pyranol transformers are the subject of a 16-page illustrated booklet published by General Electric Co. Safety features, savings in production space and cost are stressed.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

Please send me information about following CIRCLED items:

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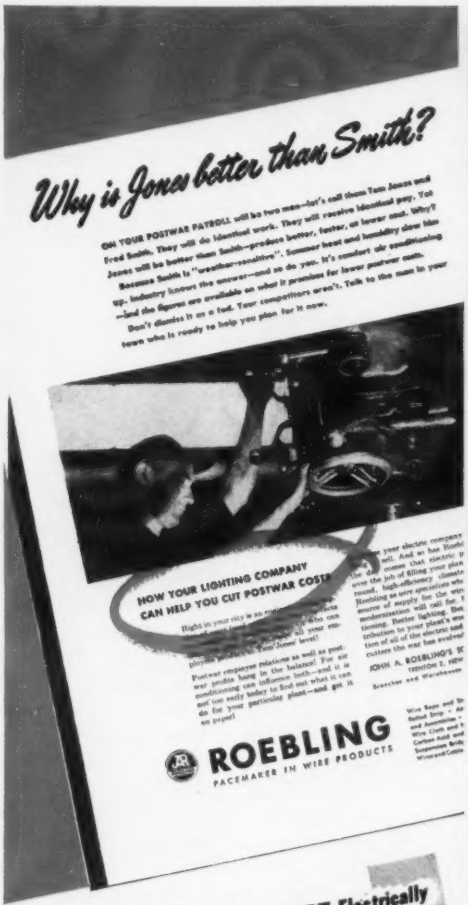
* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.


Why is Jones better than Smith?
ON YOUR POSTWAR PAYROLL will be two men—let's call them Tom Jones and Fred Smith. They will do identical work. They will receive identical pay. Yet Jones will be better than Smith—produce better, faster, at lower cost. Why? Because Smith is "weather-sensitive". Summer heat and humidity slow him up. Industry knows the answer—and so do you. It's comfort air conditioning —and the figures are available on what it promises for lower postwar costs. Don't dismiss it as a fad. Your competitors aren't. Talk to the man in your town who is ready to help you plan for it now.
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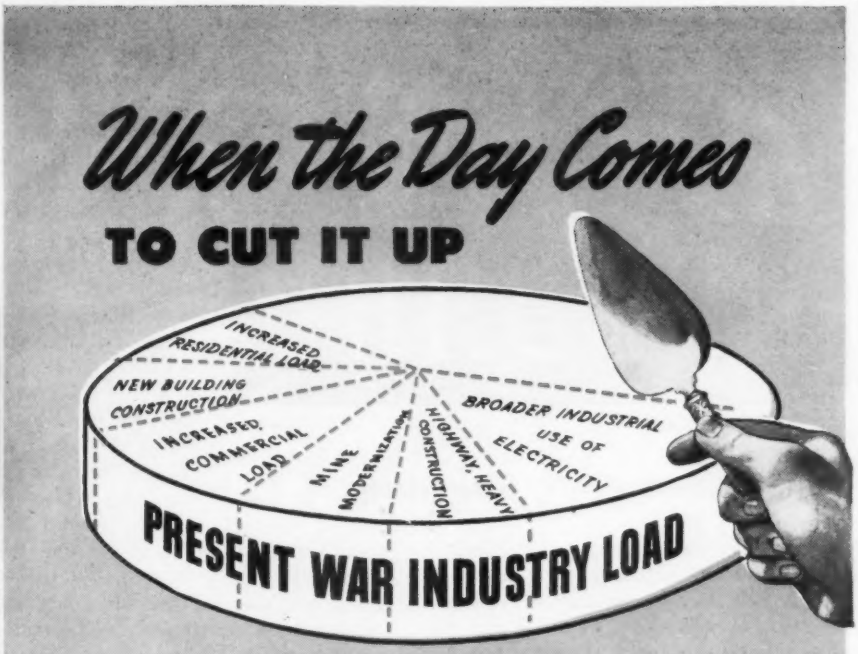


## We hope this ROEBLING advertising will have helped pave your way

When your problem changes from generation to distribution again—when heavy war plant loads drop off and you are seeking to spread generating capacity across a broad range of users, we hope these 1944 Roebling messages will have helped pave your way.

They are telling the story of better utilization of electric power in six important magazines to 116,000 industrial executives, mine owners, and building contractors regularly—and referring them all to their local electric companies for help in planning now—to cut costs later.

And, when it comes to the wires and cables you will need for that big distribution job, and for replacement of those that need it now, remember Roebling as *wire specialists* ready to supply the right conductor for every need.

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# ELECTRA'S HUSBAND

## *Grandpa's Speeding*

HAD quite a story to tell Electra tonight about what a contractor friend told me today, with tears in his voice too, even though he didn't know they were there. It topped any of her experiences with ration boards, stamps, chips or priorities with which she has "entertained" me when I reached home tired enough after a day of WPBs, OPAs and OWUs of my own.

"These kids!" my contractor friend burst out, meaning his own high school boy. "Not long ago my boy, home at dinner when I'd been moaning about some of the damnregulations, I guess, took me up on it. He began to tell me, right out of his teacher's mouth, what a fine thing these bureaus were, what good they were doing and how it might be very desirable to keep them for a time after the war.

"Well, you could have knocked me down with a gas coupon. Wasn't it enough to have to bear up as a business man under all this tripe without having your own son turn on you with the sales talk right out of the OPA manual? But that's what being a father gets you, I've found out, so I swallowed hard and asked for more.

"After the kid had unwound I said to him, gentle like, 'Wait a minute son, when you've been a contractor as long as I have you won't take everything just the way it looks in the plans.'

"You see, I'd kinda like the kid to join me in the contracting business, like I did my dad, some of these days, and it's time he learned to look for the angles.

" 'That's all very well what they tell you in school,' I told him. 'It's no doubt the way it's *supposed* to work—on paper. But I've seen a lot of plans and specifications in my day that couldn't be put in the way they said. So before you settle for what they've been telling you, maybe you ought to look into it a little, say from my side too.

" 'Tell you what I'd like you to do. Something's been holding up our gasoline allotment for the cars at the shop. We get truck gas all right but our C card for the shop cars hasn't been renewed. I can't seem to find out what it is by calling. After school tomorrow will you go down to the price and ration board and see if you can get this straightened out for me?' "

My friend had been laid up at home for some time and unable to take care of this himself.

"I'll say this for the kid," my contractor friend continued. "He certainly stayed with it. He gave up his after-school time for about two weeks. Didn't say much, but I knew from experience that he was getting the brush-off, the run-around, the go-by and some fancy buck-passing. But he stuck to it and followed the application we'd put in months back for our C card renewal for the office cars. It led through several offices because part of my job had been out of town and I'd had to get emergency allotments through some of the local boards nearest the job.

"Meanwhile we were having to use heavy trucks to make a lot of unnecessary business calls, take a set of plans out here, pick up some there, see some government official or architect here or there, run out to supervise a job and so on. All of these short runs should have been made in a light roadster we have at the shop. But we had no gas for it so it was 'grounded.'

"Well, one night Bud came in with the verdict.

" 'What is it son?' I asked him.

" 'Grandpa speeded.' "

" 'What!' "

" 'Yes, you see dad, Grandpa has the same name as you do, remember, and the business is in our family name. So when Grandpa was arrested for speeding six months ago, it was reported to the ration board and put against our gas ration records. Then when your application for renewal came in, they held it up on account of Grandpa. He'll have to watch his step.' "

SOMETHING of a fiscal crisis has been precipitated for our government by the case of the 97 pennies. It may take an act of Congress to straighten it out.

Seems that each army camp that is built has so many watts allowed it per man for barracks lighting. It's not enough for a generation of boys brought up on electricity. When they come to camp they bring portable radio sets, electric shavers, and if the light is too small to see by, as it always is, next time they go to town they buy a 100-watt lamp to put in place of the 25 or 40 that is near their bunk.

In no time at all the fuses for such circuits, calculated on the army regulations' maximum per man, will not hold. Nature takes its course, meaning that the fuse is fixed. A penny goes back of it just as it does in civilian life.

In the course of routine inspection of army properties the service command maintenance electricians check the fuses. In one cantonment not long ago the inspector collected 97 pennies from the fuse sockets.

Now the regulations provide for paying out money, but no one who ever wrote army regulations ever visualized a situation in which revenue would come in. So there have been no rules to govern what to do with the 97 pennies.

The maintenance man couldn't get any advice from anyone. It was the old army game. But he finally had a bright idea. The auditor, a fussy individual, had made his life miserable many a time requiring detailed accounting for every inch of tape he'd used, so to speak. So the maintenance man had his revenge. He dumped the 97 pennies on the auditor's desk and told *him* to account for them if he could.

The auditor is still looking through the rules to find out what to do with such unorthodox procedure as to bring in revenue. That just isn't being done, these days.

THERE'S a postwar moral for all sales directors in the story about the local sales manager who was crabbing to the general sales manager about the utter and total incompetence and inability of his sales organization.

"They're worse than a bunch of morons," was the way he summed it up.

"Who hired 'em?" asked the general sales manager.

"Why I did," answered the s.m., with a crestfallen look on his face.

"And who trained 'em?" was the next question put by the g.s.m.

"Why I guess I did," was the answer to that question also.

When I told that story to Electra she found a totally different application for it.

"It would be good to tell to mothers who wail about their children's behavior. They had 'em and raised 'em."

# Styles *have* changed since 1909, the year the first ACSR was made

Electric range, vintage of 1909

Line styles have changed, but the ACSR on this modern line follows the original formula; steel for strength, aluminum for conductivity and long life.

The first Aluminum Cable Steel Reinforced was fabricated in 1909 by Aluminum Company of America. Its size was No. 2 (No. 4 copper equivalent); a conductor now widely used in rural electrification. Six aluminum wires are stranded around one steel wire, to give a combination of high electrical conductivity, durability and high strength.

Line styles have changed considerably since then. Structures, insulators and fittings have all put on new faces. Spans have been greatly lengthened to reduce construction costs, permitting extension of service into low income areas. The advantages which gave the ACSR of 1909 acceptance by line builders have made it equally popular for these modern rural lines.

Thousands of miles of ACSR have been purchased for the construction and extension of rural lines. Builders have had the counsel of Alcoa's engineers and supervisors, receiving recommendations based on experience gained during these many years, 1909 to 1944.

This service is available to help you keep war-loaded lines on the job, or extend them into new areas. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Penna.

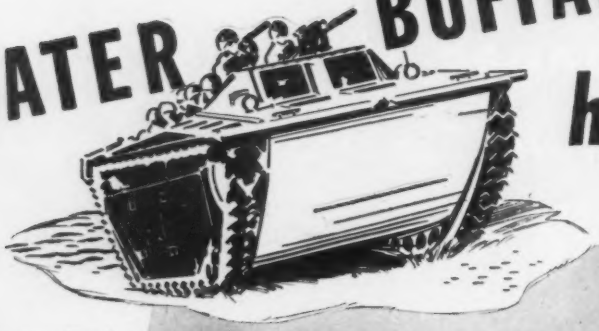
ALCOA RESEARCH GIVES YOU

PROVED STANDARDS FOR LINE CONSTRUCTION

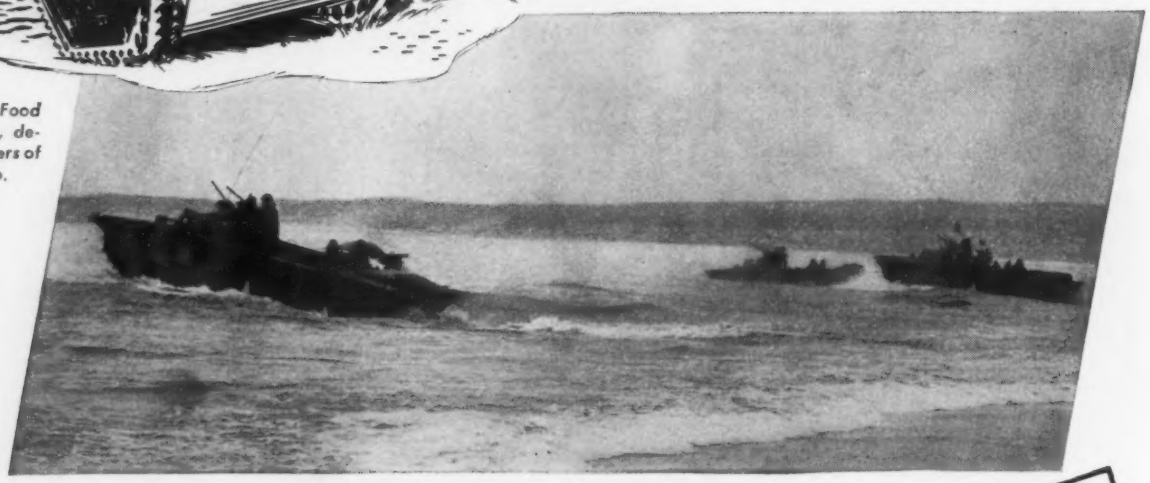
ALCOA A·C·S·R

ALUMINUM CABLE STEEL REINFORCED

# WATER BUFFALOS hit the surf on time



*Photo, courtesy of Food Machinery Corp., designers and builders of the Water Buffalo.*



## because "Electrical Innards" arrived on schedule via GraybaR

**From the battle-scarred beaches** of the South Pacific comes first-hand testimony of the vital role of these versatile amphibians. Plunging through high surf, then up and over coral reefs, they helped decisively in upsetting Jap plans for concentrating their defense at narrow reef openings.

**For this task**, and for other beach assaults yet to come, the Water Buffalos require "innards" to match the Marines who man them. The electrical systems, particularly, must be proof against water as well as the shock of battle.

**Despite great expansion** in the production program for this craft as its worth was demonstrated, a continuous flow of essential parts and materials has been furnished the builder *via Graybar*. It includes distribution boxes, junction boxes, switches, circuit breakers, terminals and other wiring supplies. One reason why the Water Buffalos were ready was the time-saving assistance of this all-inclusive electrical service of supply.

***YOUR OWN Electrical Needs*** for parts and materials to be installed in combat equipment can be effectively met by Graybar's unique combination of *procurement* and *application* service. From the same source, too, come the electrical supplies to maintain your plant and make fast production changeovers as the war program moves ahead. A local Graybar representative is ready to make your needs his *personal* responsibility.

3520

**MOBILIZED MATERIALS** No. 17 of a series of actual examples of GRAYBAR service, providing electrical materials to be installed in ships, planes and in war facilities.

GraybaR

IN OVER 80 PRINCIPAL CITIES

*Executive Offices:* Graybar Bldg., New York 17, N.Y.

GraybaR QUALITY 75 YEARS OF Electrical Distribution

ELECTRICAL WEST

VOL. 92 NO. 6
JUNE, 1944

# OUR INDUSTRY HAS A TWOFOLD OBJECTIVE

**An address by J. A. HALE, President, Northwest Electric Light and Power Assn.**

THE MIDDLE of our third year of war finds the electrical industry situation in the Pacific Northwest relatively unchanged from a year ago, except as to a state of mind—a peculiar psychology fraught with danger. At the outset of this article I should like to elaborate this point a little and throw out a word of caution.

We are still very much at war. We have only just begun to win it. No one knows how long it may take us, nor how costly the victory may be, and we on the home front must not relax for one minute the diligence with which we continue doing our part. Yet, along with our desire and obligation to win the war, we have an obligation to look beyond hostilities and plan for the future, to make sure that what we hope to win is not lost in the victory. This means that we must find some time and energy to devote to intelligent planning for eventual peace, which inevitably will bring a trying period of readjustment from a war economy to a peace economy. Many people embrace the idea of postwar planning with zeal, and it is laudable that they do. Jobs must be found for the returning soldiers and for the workers released from armament production. The shock of possible unemployment, depression and kindred evils must be cushioned, and, in the cushioning process, private initiative and free enterprise must be retained if this is to remain a free and happy nation.

The danger in the situation is that our planning for the future and the wishful mental attitude this produces, must not give us a false perspective of the immediate job ahead—the winning of the war. It must not deter or cause us to relax our efforts toward this prime objective. We must keep our thoughts and our acts in proper balance with respect to this twofold objective—winning the war and planning for a better America.

The electrical industry, in common with all business and industry, has during the past year taken up the burden of planning for the future and God grant that we be wise enough to fulfill successfully the problems and obligations we face in these perplexing times.

For a quick general picture of events and trends in the electrical industry in the Pacific Northwest in the past year, I would note that war production loads have not increased materially; in fact, they have dropped off in some localities. There is, as there has been throughout the period of war production, ample capacity and energy for all demands in sight; there is no threat of shortages or demands that cannot be met. The Pacific Northwest power pool is operating smoothly with the background of another year of successful operating history behind it to make its future operation even more effective. The manpower situation in the critical war industry area is tending to become stabilized, although operation of the draft is creating manpower troubles in some spots. At the same time, returning service men are beginning to filter into their old organizations to a small extent.

HALE

A lessening of the danger of bombing or invasion by the Japanese caused military authorities to relax dimout regulations on the Pacific Coast, and this brought back some of the lost lighting loads of the dark days following Pearl Harbor, the return to normal being still limited by the Voluntary Conservation Program for the saving of fuel, labor and critical materials participated in most wholeheartedly by the electrical industry. At the same time production of certain war material reached a point permitting release of small amounts of critical metals for other uses, thus the material and equipment situation has been eased to some extent. It is now possible, and desirable, to extend lines farther to serve rural customers, and a very limited number of appliances are being manufactured for civilian use. One might almost say that the transition period has begun, and the planning we are now initiating is not so much "postwar planning" as it is "planning from here on out."

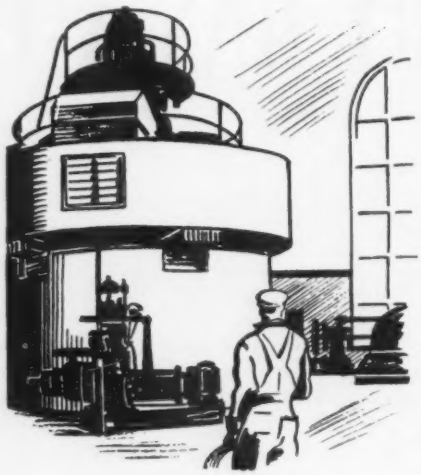
This double objective I have referred to, winning the war and planning for the peace, has been reflected in the activities of our association during the past year. The four section

meetings thus far held, and the two that are being planned at this writing, have maintained a sound balance of topics between problems of the immediate present bearing on our direct war-related operations, and problems related to the conduct of our businesses in the future, when the shooting shall have ceased. All three sections, Accounting and Business Practice, Engineering and Operation, and Utilization, have committees actively at work on projects falling into the category of so-called postwar planning. These projects parallel very closely the projects being worked on by individual companies, and they are in most instances designed to produce information that will aid the companies in reaching solutions to their own particular problems.

In addition to these three regular sections, a new section has been organized through the establishment of a personnel conference to give attention to employee problems and related matters, which have become accentuated through the shifting of labor in our conversion to war economy, and which promise to carry over into the postwar era. The initial conference of this group was held in Portland in March and, as an outgrowth of its deliberations, six committees were formed to study different phases of personnel work being done by the member companies, with the intent of reporting at a second conference later this fall. Much valuable material is expected to come from these committee studies, which will bring out strengths and weaknesses in methods and practices in handling the new personnel problems that have been created.

Planning "from here on out" by the association is being activated and coordinated through another new committee authorized by the association executive committee at its initial meeting last fall. This committee, called the electrical development committee, consists of representatives of the three sections; the new personnel conference; and of the manufacturer and distributor members of the association, and is chairmanned by C. Patrick Johnson, vice-president of the Puget Sound Power & Light Co. The committee will encourage company planning, will direct survey and research projects by section planning committees for the aid of member companies in their own planning, will suggest united action or policy in matters where suggestions are desired, and will cooperate with planning being done in the industry by exchanging material with other planning bodies. The committee acts chiefly as a directing and coordinating agency, with most of the work being done by the existing section organization.

One project the committee itself has undertaken is the staging of a series of meetings throughout the territory primarily directed toward the electrical contractor and the former dealer in electrical merchandise. These groups have never been drawn into our association activity in any number. They are a definite and important part of



the electrical industry. They are the medium through which promotional plans of manufacturers, distributors and utility companies are given effect. An effort will be made through the planned meetings to tie these groups in with us, so that when conditions again permit promotion of appliances, there can be presented a united industry front of manufacturer, distributor, utility and dealer. Competition for the consumer dollar will be keen after the war and our industry will need all the concerted effort it can muster to be of supreme usefulness.

The program for these meetings is to take the form of a preview of postwar plans of manufacturers, distributors and utilities along with demonstrations of new equipment and inspirational talks on the potentialities of the coming electrical age. Meetings are to be held not only in the large metropolitan centers but in the smaller cities, so as to attract local dealers and contractors who could not be expected to make long trips to the large centers.

These activities of our association we believe to be in tune with the times. They represent a change in our method of operation during the past two years, when our problems were almost wholly direct-war-connected. They reflect the balance we must adopt in our company and individual thinking in these times when war is still raging at high tempo and yet when we must be looking forward to our obligations of the future, in respect of our companies, our employees, our customers and our communities.

No annual address of a president of this association in recent years, would be complete without a reference to the public power question, which has been so persistently with us for so long a time. Of immediate importance to all of us, and to the public at large, is the vote to be taken on Referendum 25 in the state of Washington in November. This measure provides that two or more PUDs, generally organized along county lines in that state, may join to form a super-PUD which would have authority to buy out private electric utility companies. This proposal was set up as a substitute for the Bone-Smith bill, which died in the Federal Congress a year or more ago. This bill would have authorized the federal government to buy, own and sell or operate privately owned electric companies.

Many are aware of the implications of Referendum 25 and are pointing out how little responsive to the people these super-PUDs would be since they would be dominated and controlled by the group that has been for many years conspiring to socialize the electric utility industry. It is difficult to believe, that if the people understand this fact fully, they will pass the measure.

The electric utility industry is still in business, in the main, as a privately owned, business managed industry under the long-accepted American free enterprise system. Most of the companies in this territory came into being in their present form in the early 1910 decade. During the past thirty odd years they have weathered many storms of nature, of politics, of punitive regulation, of depression and of war. They have ever emerged stronger and more virile, more able to meet the demands upon them for lower rates and a better and more extended service and, unless there is a great change in the social, economic and political philosophy of the people we serve, it seems likely that we shall continue to exist as respected citizens of our communities, playing an important part in advancing the social and economic welfare of this great nation.

In conclusion let me as president of the Northwest Electric Light & Power Assn. extend my most heartfelt thanks to Berkeley Snow, our efficient secretary, who carries on the main burden of the association work, to the committee members and committee chairman, who have been so ardent in their efforts to make this a successful year and to the member companies for their wholehearted cooperation and support.

# NEW CHALLENGES FOR LEADERSHIP

**FRANK C. ANGLE, President,**
**Pacific Coast Electrical Assn.**

THE SOLUTION of every emergency is strong, responsible leadership. Never in history has leadership been faced with such complex problems as those imposed by the war and those which will come with conversion from war to peace.

Private enterprise accepted the challenge in 1941 and America has not only out-produced all nations with their various economies, but has done so at ever-decreasing unit costs in the face of increased labor and governmental charges.

Along with everyone else, the electrical industry mobilized in 1941 and is now engaged in an all-out effort, not only to win the war, but the peace to follow. The great land and sea offensives of 1944 are now realities, or are about to be.

These will undoubtedly mark the peak of military demands on both men and machines. The impact of returning normalcy must not find industry unprepared.

It is pleasing to observe that all industry has gained in stature during the war emergency. Because of superlative war performance, it is possible to detect a change in the tide of public opinion away from bureaucracy toward free enterprise; against regimentation in favor of the "fifth freedom"; and against philosophies of foreign origin in favor of government by law.

I know of no industry which was so well prepared for the war as was ours. Let us be equal to the demands of peace. Let us face the postwar era, not as a hazard, but as an era of unlimited possibilities. We can do this if we have a firm foundation of confidence within the industry itself.

Bureaucratic pressure now challenges every branch of industry. The contractors have and will continue to face harassing investigations; utilities will continue to have competition from subsidized and tax-exempt agencies, while the individuals of the industry struggle to free themselves from the ever-pressing threat of loss of personal initiative. The answer to all of this is responsible understanding and cooperative leadership in all political and industrial life. We who serve approximately 23,000,000 homes, nearly 2,000,000 farms and possibly 4,000,000 industrial and commercial enterprises must accept a full measure of responsibility for the postwar environment in which private enterprise will operate. Men and women of the industry must understand the problems and psychology of government and take an active interest in it.

We who serve an ever-increasing market at decreasing costs must lend our talents to agencies of government. We must constructively criticize.

Your association is ever mindful of its responsibilities. Our activities during the past twelve months have been molded to meet war restrictions. District meetings which in the past have been sponsored by the industry information committee, have been canceled due to restrictions of travel and food rationing. These will be reconsidered as soon as conditions permit. Both Fall and Spring meetings were split into northern and southern groups with parallel subjects of discussion.

From these meetings and their resulting committees have come findings of national importance, such as simplification of appliance construction, standard specifications for hot water heaters, an improved approach to adequate wiring, improved standards of employee relations, a review of distribution line construction and high-level operation and maintenance of equipment with reduced personnel.

We approach reconversion with confidence. We do not look on peace as a business or political hazard, but rather as a new era of unlimited opportunity. Every invention or discovery tends to abate human fear and want. With each invention and discovery, we find increased employment, new foundations of credit and new sources of revenue. Only by increased production can our national income be maintained at levels which will insure proper servicing of our national debt. We must appreciate the importance of maintaining a safe ratio between the total cost of government and our national income. Responsible economists are led to believe that the maximum cost cannot safely exceed 20%. Only by decreasing demands on local, state and federal agencies can a proper balance be maintained. Let us assume our share of this responsibility.

Changing economic conditions demand our full attention. We must recognize the necessity of further processing many of our raw materials. Cotton, flax, ores and forest products present problems which must receive increased attention. The day is gone when 65% of our timber can be wasted either in the woods or in processing; cotton must be spun and woven in the West; ores must be reduced near their source.

We who stand to benefit from an industry must share in shaping its course.

Our industry has grown because those in it keep discovering new possibilities of service. Ours has been the will to lead; this we must continue to do. The reward is wide-spread recognition, public acclaim and a profitable enterprise.

Only by high levels of production can increased benefits be made available to labor, while industry competes in a free trade world.

Public recognition and acclaim release forces of envy which attempt to destroy when they fail to equal. This we must recognize.

Let us accept this challenge to leadership by increased devotion to things that are American: Freedom of political, social and economic life; freedom from rule by a well-organized, irresponsible minority; and a high standard of living for those who are willing to work for it.

Having accepted leadership, we must be ever mindful of the pitfalls which lead to mediocrity.

ANGLE

# A NEW PATTERN FOR THE FUTURE

**C. C. BAKER, President, Rocky Mountain Electrical League**

OUT of a welter of jittery speculation and a pandemic of fears that have long plagued those of the electrical industry, there finally has emerged new faith and courage. Nor is this new-born optimism predicated solely on "wishful thinking," in the Rocky Mountain region, at any rate. Paradoxically, in hopefully looking to the future, utility men are accepting their fate. In other words, they will be guided not solely by a new pattern of their own cutting, but by a pattern that, like a jig-saw puzzle, incorporates some of the worst as well as some of the best that has come out of the exacting and eventful war period. The die has been cast; it cannot be ignored or thrown aside for something entirely new and better. No miracle, no benign influence will be our salvation. Rather, we must depend upon our own resourcefulness, talents and energy.

This new spirit is obviously rife in the Rocky Mountain area today, as evidenced by the vigorously accelerated activities of every branch of the industry. Membership in the league is growing without stimulation, particularly in the retail group, while other classes which, on a wartime, no-business basis, suspended affiliation, are returning to the fold without solicitation.

Aside from the more serious economic and political problems that are engrossing members of the industry, wiring envelops the minds and activities of a major portion of the league membership—distributors, contractors, dealers, manufacturers and utilities.

Appreciation of the necessity for wiring and re-wiring was never before so apparent in Colorado, New Mexico and Wyoming. Even the dealers, who previously could not be coaxed or cajoled into giving some thought to this factor in the use of electrical service, now realize that they must have something in the home to which they can attach appliances, else selling will lag after the first flash flood of buying. And many within utility circles, particularly higher executives, who heretofore have ignored adequate wiring because it was "just another darn thing to promote from New York," appreciate they must have some channel through which to siphon off the glut of electrical energy that impends. Consequently, the neglected child has been fondly taken to the industry's collective bosom.

Partly because of the effective work of the adequate wiring bureau, which was just striking its stride when war came, and partly because of the promise of new, novel and useful electrically impelled devices after the war, the people themselves are evincing an interest in wiring never before equalled. Many are afraid they are going to miss something—television, for instance—if they fail to include reception facilities in their homes. Architects and builders, who were wont to include wiring in their construction plans on a "oh-yes,-I-almost-forgot,-we-should-include-some-wires" basis, are now beginning to appreciate the selling arguments revolving about a properly wired home or other building.

Another revolution, or evolution, is under way in the Rocky Mountain territory. Dealers, for instance, are not fooling themselves as to postwar business. They are not taking the attitude that after-war sales will flourish with boom-like proportions indefinitely. They are looking to, and preparing for, the day when promotion and salesmanship will be as necessary as ever before, particularly in a world which will be filled with so many competing new and alluring comforts, conveniences and articles of merchandise for which the long-denied public will be needful and desirous.

It is at this point that dealers of the Rocky Mountain region evidence an entirely new concept of the value of the electric light and power companies, with whom they are voluntarily becoming affiliated through league membership. Whereas many retailers in the past, resented sales and promotion by the utilities, they now appreciate that these institutions will be the most powerful factor in re-stimulating and maintaining the market for appliances. Even in those localities where the power companies abandoned merchandising years ago, dealers are speculating as to the probable resumption of sales effort, whether on a dealer cooperation basis or independently. In the event the latter course is adopted, dealers realize they will secure a portion of the business that is drummed up by utility creation of desire on the part of the public.

BAKER

Engineering and operating problems, current and future, somewhat neglected during the war period, so far as league activities are concerned, have sprung to the fore. Government competition, through wholesale production of power, and in the invasion of already occupied domains of existing utility companies, have posed numerous challenging problems for those charged with the future of their organizations. Poised on the horizon is another threat which, while not yet taken seriously by some members of the industry, is still acutely arousing the concern of many others. This threat is "packaged power." During the recent spring conference of the league, packaged power and similar competition received long and serious consideration, the opinion being expressed by several of those present that, unless the electric light and power industry adopts counter measures and super-efficient sales methods, isolated power installations may very well constitute the same threat with which horse-drawn vehicles were confronted with the advent of the automobile.

Standardization and improved methods of production and distribution also are claiming the serious attention of engineers and operators, who, heretofore, have been solely concerned with priorities, scarcity of materials and equipment, etc.

In recognition of its territorial coverage and the scope and variety of its membership, the league, more than at any time in the past, is becoming an all-industry association. Pre-

viously, its activities and functions revolved largely around the utilities, manufacturers, distributors, contractors and dealers, as such. In recent months the league has been looked to, and depended upon, to act as the cosponsor and clearinghouse for practically all other organizations directly or indirectly attached to the electrical industry in this region. The league's headquarters' staff and facilities have been placed at the disposal of the Illuminating Engineering Society, electrical inspectors, engineering societies and similar organizations, for which the league has largely provided publicity and promoted conferences and meetings, of local as well as national import. As with the public, for which the league has acted as a clearinghouse for repair and replacement of appliances, the organization now has accepted numerous responsibilities in furthering electrical education and appliance repair and maintenance in the Denver Opportunity School and other educational institutions located in the territory served.

On top of these functions, the league, throughout the entire war period, has earned an enviable reputation, nationally and locally, as an effective war service agency.

# STATESMANSHIP, NOT POLITICS IS THE ANSWER

**FRANK McLAUGHLIN, President, Puget Sound Power & Light Co.**

At the Teheran Conference Russian Premier Josef Stalin said, "Without American production, the United Nations would not have won the war." This simple statement, as potent in its basic implications as Lincoln's Gettysburg address, is undoubtedly the greatest tribute ever paid to the American system of free enterprise. It conclusively shows that the American system, which was branded as a malefactor of the people during the "business-baiting thirties" has proved to be the world's greatest benefactor in this hour of grave peril.

Yes, all the free people of the world are being blessed because here in America the system of individual opportunity has magnificently met the unprecedented demands of war. The performance of American industry has been truly amazing, and we in the electrical field can get deep satisfaction from the fact that we have had a major part to play in the present conflict of "free men" against "men in bondage."

It is natural that we of the electrical industry should play such a leading role at this time because not only is electricity the life blood of modern industry, but the real objective of its use has been to free man from drudgery and to bring about a more happy, fruitful living for our people. Edison has deserved being called the world's greatest benefactor, and in these days when there is so much agitation about socialization of electric power, we should not lose sight of the fact that electricity is such a positive force for good in the world that the people are not going to stand for its use as a "political tool" for more regimentation and social reform.

Eighty-five per cent of the power for industry comes from the private utilities. This in itself shows that you do not have to have socialized electric power in order to make outstanding war production records. By the same token, it is ridiculous to say that those who have done such a marvelous job for war cannot do the best job for the people in peace. Free enterprise in every field of endeavor will measure up to postwar requirements, if government does not hamstring it.

Perhaps the best answer to the after-the-war place of private enterprise is to be found in the Honorable Lloyd George's statement to Eric Johnston, president of the United States Chamber of Commerce, on the occasion of the latter's trip to England some months ago when the former Prime Minister said:

"You Americans can look around and see on all sides what individual enterprise has contributed to your economy and you will want more of it, not less of it, after the war."

Now, of course, the primary issue before us all today is the winning of the war as quickly as possible, and the consequent early return of our loved ones now in the armed services. To this end the manpower and resources of the electrical industry have been efficiently and effectively mobilized, and toward this goal it will continue to bend its every energy. That the electric industry has done an outstanding job is, I believe, generally conceded, and its record shows that at no time since the war began has electricity been "too little or too late."

The following quotation from a letter from J. A. Krug, the then director of the Office of War Utilities, dated Feb. 26, 1944, to Tom P. Walker, president, Council of Electric Operating Companies, is proof that a good job is being done. You can take it as your Army and Navy "Es."

"I hope you will pass on to the utility representatives present my sincere appreciation of the excellent and wholehearted cooperation which we have had from your organization and from all of its member companies individually.

"The critical war production year of 1943 is behind us with all of its rapidly increasing power needs safely met. I am confident that the power facilities now in place, supplemented by the limited number of new plants still under construction, will adequately provide for all essential power requirements in 1944 and 1945. No segment of our war economy can boast of a better job and at the same time this achievement was accomplished with the minimum use of materials so necessary in the direct conduct of the war."

Now, next in importance to our war effort is the doing of the things which will assure our effective functioning after the war. Competition in all lines of endeavor will be keen in the postwar period and, if we are going to assume the dominant place in the peacetime economy which the kind of business we are in demands, we must make up our minds that we have got to intelligently and vigorously fight for it. We must be as dynamic a force in the field of human relations as our product is as a servant of man.

Unfortunately, as we go into planning for electric power in the postwar period, we find the issue beclouded and the situation cluttered up by politics. It seems the more power people use, the more politics we get, and the lower electric rates become,

It is about time electric power ceased to be a political issue—that it was put on an economic basis and the urge for socialization nailed in its tracks. If kilowatts are to do a bangup postwar job, they must be directed by economic statesmen, not by political sharpshooters. A constructive over-all program must be advanced for preservation of private enterprise in the power field.

the cheaper the politics. High octane public power propagandists are telling the people, "We won the war and, if you will impose the 'death sentence' on the private companies and give us complete socialization of power, we will give you a Utopia after the war with 'kilowatts a cure-all' and with Uncle Sam ever the Santa Claus for the more abundant life." There is just too much in the way of sky-writing, muddy thinking and just plain applesauce as to electric power's place in politics.

Why, even today in the midst of war, when grave problems of great magnitude confront us and the blood of our country's best is being spilled on the battlefields, the politicians are making electric power a major issue. The fact that our rates are about half the national average makes such tactics all the more absurd and ridiculous. Why, a 10% reduction in the average family's tax bill of today would effect a saving of more than double the average domestic customer's electric bill, and yet they want to take the private utility tax-paying property off the tax rolls. If they really want to serve the public interest, they should be sponsoring a movement to put public power property (now tax exempt) on the tax rolls.

The power issue is not an economic one—it's political. "More Socialized Electric Power for Greater Political Power" is the politicians' game. All the ballyhoo along the lines that socialized electric power is the thing that is going to solve the after-the-war problems and make the territory a swarming beehive of industry is just a cover-up for more bureaucracy and more regimentation—and more political domination of business.

It is about time electric power ceased to be a sizzling political issue —that it was put on an economic basis and the urge for socialization was nailed in its tracks. If kilowatts are to do a bangup postwar job, they must be directed by economic statesmen and not by political sharpshooters. A constructive over-all program must be advanced for the preservation of private enterprise in the power field. Through an enthusiastic, yet realtistic and objective approach, the people must be convinced that their destiny rests with private power and not with public power.

It should be pointed out that, just as socialization of an individual's own business is not a good thing, socialization of power is not a good thing. I have always observed that, when a house is on fire, everybody wants to help put it out, not only because of the good neighbor policy but so that their own homes next door or across the street will not be menaced or destroyed by the flames. The same should be true as to socialism in business for the same reasons. Further socialization of power today means socialization of something else tomorrow, because such a program menaces the people's political and economic freedom and the freedom of standing on their own feet and running their own businesses. We have seen in Europe what happens when these trends are followed to their inevitable conclusion — the government becomes all-powerful, and the citizens merely slaves of the state.

No doubt about it, the real solution to this power issue must come from statesmanship; politics will never solve it. We have private power as a part of the American pattern of life. It has been woven into the fabric of America so closely that it can't be torn out without ruining the garment entirely. We have federal public power existing alongside, and its promoters are very unhappy because private power is so ungallant as to want to retain a part in the drama that is the story of America. The American taxpayers have paid hundreds of millions of dollars for its public power projects. It would be sheer folly to waste such an enormous investment. The statesmanlike thing to do is to use both private and public power to the utmost and our postwar plans should be laid out accordingly.

After this war we should not scrap anything. We mustn't junk our Navy; we mustn't plow any cotton under; we mustn't slaughter every third pig to create an artifice of scarcity; and by the same token we mustn't junk any power systems, be they public or private, on the altar of ideological caprice or political expediency. We must use everything we have. If no apparent use exists, we must find uses. Every kilowatt of generating capacity, public or private, that exists in this country was paid for by American money and represents an asset of the American people—be they taxpayers, investors, or both. Every kilowatt should be translated into benefits for the people without loss to the taxpayer or investor. Automatically, such a program outlaws politics. These various federal projects should not be used as instruments of social reform.

I have often said, and I still believe, that such projects as Bonneville and Grand Coulee should function as they were conceived—that is as generating plants. The electricity that they generate should be distributed by the existing municipal and private utilities, with any savings effected being passed on to the consumers. These federal projects are doing an outstanding war job without the necessity of retailing the power produced or putting the private companies out of business. Postwar developments can likewise be fostered without the complete socializing of the distribution of power.

*A big job lies ahead—the answer is not to put anybody out of business —it is to work together to put more people in business.*

I believe that every American is disturbed today because of the extent to which centralized bureaucracy is regimenting the individual and controlling and dominating the economic and political life of the country. Today business generally and people collectively are up against, broadly speaking, the same thing which the power companies have had to contend with out here for so long. As an illustration, insurance and medicine are under the gun of socialism in the Wagner Bill, the same as the power companies in the State of Washington are with Referendum 25. In other words, today it is not just a case of the power companies—the big question is whether all business is going to be socialized and the people lose their political and economic freedom. On all sides, there is evidence to the effect that people are now aware of the fact that their Bill of Rights and the existence of the free enterprise system are being threatened, and they are most anxious to fill up the holes in the dike so that they will not become engulfed in a flood of socialism.

Yes, the way things look today, all

kinds of businesses have got to hang together in keeping socialism out of business, or *each will hang separately by first one and then the other being put out of business.*

Fortunately for everybody concerned, many more people are alive to the dangers of government ownership and operation today than ever before, so that we can obtain the effective cooperation of those who, like us, want to keep in this country the system which has made it great.

Now, I am not going to attempt herein to discuss specifically the merchandising of our product in the postwar period, as space does not permit, and I believe others will make outstanding presentations as to the marvelous part electricity is going to play in the world of tomorrow. We sell a truly remarkable product. Its performance has been amazing, and yet we have just scratched the surface when it comes to electricity's contribution to the welfare of man. Many revolutionary developments will come after the war as a result of the research now going on. My chief concern is not with our ability to do a postwar job that will stagger the imagination, but to make certain we will have the opportunity to do it. In the interest of maintaining our proper place in the world of tomorrow, and so as to prove worthy of the trust reposed in us, we must, in cooperation with our fellow men, lead in the broad recognition of and universal adherence to the following:

*First*—that America must be kept as a land of opportunity in every respect for the individual. Furthermore, the individual must be regarded, not as a cog in a machine, not as one to be regimented, but as a human being with hopes, aspirations and a desire to better himself, and he must be assured of the opportunity as he contributes to the welfare of society to obtain a more generous measure of the good things of life. He must be allowed to travel as far as his talents will take him, *a la* Edison, Westinghouse, Bell, Ford and the like. To make this democracy of

ours work, the individual must have, after the war, the freedom he is now fighting for.

*Second*—There must be effective cooperation between all the producing groups. None should be allowed to benefit at the expense of unfair restrictions and regimentations imposed upon the other. No group should advocate the socialization of other groups while opposing socialization of its own group. Those who believe socialism is a good thing should try it on their own piano first. It must be recognized that in our modern society, real prosperity only comes from harmonizing the interests of all producing groups.

*Third*—We must have able men in government. An absolute must is that only men should be elected to public office who will provide good government. Men who believe in the principle of the people running the government and not the government running the people—who believe that the individual and business and agriculture should be given the greatest amount of economic freedom and opportunity for service and progress.

Men who will stand committed to an equitable tax policy that will result in maximum employment of men and money in free enterprise.

Men who believe that the laborer is worthy of his hire—and that Capital is entitled to a fair return—and that you can't build empires with doles and boondoggling—and that you cannot substitute government paternalism and Uncle Sam's pocketbook for the rugged individualism and the sterling qualities of the pioneer.

Men who believe that restrictions and regimentations necessary under wartime conditions must be removed as soon as practical, consistent with the maintaining of a sound economy.

Men who believe that government should do only what individual initiative cannot do—and that during the transition period from a war to a peacetime economy, goverment should help private enterprise, rather than promote socialistic activity.

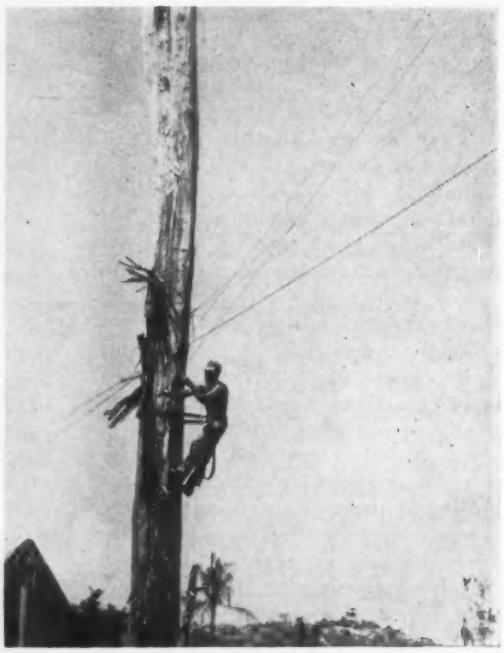
You cannot preserve and promote private enterprise in any state or the United States by putting socialists into public office.

*Fourth*—We must have the finest character and highest quality of leadership attainable—not only individually in our own affairs, but collectively in all those things that make for community progress and prosperity. After all, it's people who build cities, but they must have enlightened and courageous leadership. So I say, give the people something to get their teeth into. They want statesmen to steer the good ship Opportunity in the "World" of tomorrow. It's up to you and others like you to take the wheel and do the job. If an industry does not have the right kind of leadership it will not break the tape a winner, and it will not hit the home runs—and it will not make the touchdowns. You have done a magnificent job in the face of great difficulty. You have got the "Know How" and the "Can Do." It would be silly for anyone to assume that you will not do a bangup peacetime job, because if you don't you will not stay in business, and all of us are going to stay in business.

Your greatest challenge is to make the electric industry "strong from without" but you have got to be strong "from within" before you can be strong "from without."

# Seabees Run Frontline Utilities

Power and communication are more important on the war front than they are on the home front. In the South and Central Pacific, the job of repairing captured facilities or installing new ones falls to the Seabees, the Navy's famous fighting construction men. The two pictures below show repairs being made to a captured Jap power installation on one island. The Diesel generators were running when the boys moved in, but shelling and bombing had wrecked some of the lines. A fallen transformer rests on the ground in front of the hairy-chested "grunt" in the bottom picture. Advantage is taken of all natural facilities and coconut trees made excellent poles. The Seabees, many of whom are ex-utility men, select fancy names for their systems. On one island the system is known as the M-A-N Light & Power Co., named after the Marines, Army and Navy. Another system is known as the Island Power & Telephone Co. Not the least of the maintenance problems is to restore lines after a bombing. Snakes and bugs worry the Seabee linemen but they don't have to contend with creosoted poles. Their contention is that they work at their job with "blood and sweat and no spare parts."



Seabee photographers took these shots which were brought to ELECTRICAL WEST by Dr. N. A. Bowers, "Engineering News-Record" Pacific Coast editor, who spent three months in the South Pacific. On one island he met Lieut. T. H. Underwood, formerly with Coast Counties Gas & Electric Co., who was officer in charge of power and telephone utilities.

# KEEP NO SECRETS FROM YOUR EMPLOYEES

**CHARLES GRUNSKY, Chief Engineer, Coast Counties Gas & Electric Co.**

DEVELOPMENT and training of non-industrial employees has lagged far behind the training of the people who man industrial production lines. The war has brought a surprising advance in the application of scientific procedures which will improve work habits, instill interest in the job and inspire loyalty to the employing organization. Even so it has been estimated that there is a 15-year lag in service and commercial organizations in the application of employee educational programs as contrasted to production industries.

If those with a service record of ten years or more will think back to their initial employment, they will appreciate the shortcomings of training methods and respect the opportunities which exist in this field. Chances are they were interviewed by a "boss" or a "manager" without benefit of any personnel department, told they were "okay" and then turned over to a subordinate who would "show them how things run and tell them what to do." After that they were largely on their own. Much of what they learned was absorbed, much that was vital was never learned and self-development was left largely to individual initiative. If they happened to be classed in the "white collar" group, they were presumed to have certain inherent job advantages such as stability of employment, shorter hours, higher earnings and better working conditions. Today most of these differences have disappeared, while training equal to that afforded the worker in the production lines is still denied them.

Consciousness of the need for employee educational work, particularly because of the influx of new people occasioned by the war, induced the management of Coast Counties Gas and Electric Co. to develop a series of employee information letters which had a dual purpose—first to inform present employees on facts they might not know and, second, to give new people a thorough knowledge of the background, history and significant factors of the utility business. Initially it was planned to prepare a series of 26 letters to be mailed at bi-weekly intervals covering background or orientation material regarding the company and its relation with employees, customers and the public. However, wartime conditions reduced the number to 19 because the projected remaining letters dealt with sales activities which are out for the duration. Each of the letters is accompanied by a questionnaire which the employee answers after having read the information letter. These are graded and returned in batches of three or four.

It is easy to imagine the feeling instilled in a new worker who receives the following letter—at home—from the general manager of the company:

"Dear Sir:

"You are a new member of the personnel of Coast Counties Gas and Electric Company, and this letter is to welcome you and to help you feel 'at home.' Whether you later become a permanent employee will depend upon your ability, your performance and several other factors. Naturally, there are already many things you are wondering about, many questions about the organization and its methods which you would like to have answered.

"With this objective, we have arranged to send to you occasionally an 'Information Letter' discussing some phase of the company's business. Material for these bulletins has been prepared by employees experienced in the lines of work they discuss. The first bulletins will be of a general nature. Then, after an idea of the structure and workings of the organization has been presented, they will treat with the detailed operation of various departments. Each letter will be accompanied by a brief 'questionnaire' which you are requested to fill out and return in the envelope provided.

"We are furnishing you with a folder for filing the letters. You will thus build up a valuable and convenient source of reference for the future. You realize that in order to progress in your work, it is necessary to thoroughly understand the organization's background, structure and functions. Consequently, we hope and expect that you will give these letters and their accompanying questionnaires your thoughtful consideration. You will find that the knowledge thus gained will make your own work more interesting, enable you to cooperate effectively with employees in other departments and increase your value to the entire organization.

Sincerely,"

This letter is an original, sent first class. It is presumed that in larger companies it might be signed by a district or division manager. Then at regular bi-weekly intervals there follow letters on the following subjects and in the following order:

1. Brief History of Our Company
2. Territory Served
3. What is a Corporation
4. The Railroad Commission
5. Rate Making
6. The Story of Gas—Part I Manufactured Gas
7. The Story of Gas—Part II Natural Gas
8. The Electric System
9. The Gas Department
10. Gas Supply
11. The Electric Department
12. The Accounting Department
13. Every Employee a Salesman
14. The Commercial Office
15. Meter Reading and Billing
16. Depreciation
17. Federal Power Program
18. The Sales Department
19. Public Relations

These "information letters" are not limited to new employees, being sent in the first instance to the entire company personnel. Quite naturally, the introductory letter is worded somewhat differently when addressing an experienced employee.

Every effort has been made to keep the material in the series brief, interesting, simple and informative. Most of the letters are printed on two sides of a single sheet; only six require more space.

The letters are printed by the offset process which permits use of illustrations and pictures. These are used to advantage throughout the series.

A binder in which the entire series

may be kept accompanies the first letter. Each letter on the series is sent to the employee's home unsealed at the 1½c postal rate. Only exceptions are the letters which contained three or four questionnaires which require first class postage. An envelope addressed to the official who corrects the questionnaires is included with each letter. These are handled through company mail so that the employee does not have to provide postage stamp.

The questionnaires are simple, usually requiring a "true" or "false" answer or the selection of the correct statement from a series of three or four. To answer them intelligently, the recipient must read the accompanying information letter.

The fundamental nature of the information presented is demonstrated in the accompanying reproduction of a sample letter.

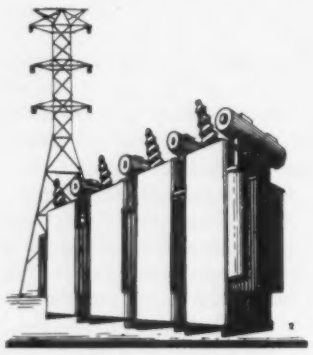
Some extremely technical aspects of the utility business (and similarly of any other type of business) can be expressed in language the average employee can understand. Here is the manner in which the letter on rate making discusses "fair return":

"It is an accepted principle based on established legal doctrines and decisions handed down by the United States Supreme Court that a public utility company is entitled to a 'fair return upon the fair value of its property used and useful in the public service.'

"This indefinite wording has come to take on a definite meaning, and all regulatory commissions, including our own California Railroad Commission, are therefore guided by certain controlling fundamentals in determining rates for public utilities. The practice followed varies somewhat from state to state, but in general it is similar to the California method outlined below. Let us say that long-term investments in private business of like risk can be attracted by 7% interest. Then the utility would be entitled to a 'return' or interest of 7% on its actual investment in properties over and above all operating expense. Out of this return the utility must provide for bond interest, interest upon the depreciation reserve, as well as preferred and common stock dividends, none of which are considered 'operating expense' in the sense used above.

"Rates are always made for the future, and it must be borne in mind that the ultimate purpose of a rate proceeding is to readjust the company's revenue through rate changes so that the return on the investment will, in the future, be a fair amount or percentage.

"The total amount on which the company is entitled to earn is called *Rate Base.* Receipts from sale of gas, electricity, or water are called *Gross Revenue.* This, less operating expense is called Net Revenue, or *Return,* and the percentage return bears to rate base is called *Rate of Return.* Bond interest, stock dividends, and interest on depreciation



reserve, as above noted, are not classed as items of expense, but must be taken care of out of the net revenue allowed the utility."

Similarly depreciation and obsolescence are described as follows in the letter on that subject:

"It is difficult to conceive of any structure, piece of equipment, or tool which does not suffer some impairment in its usefulness in the course of time. This impairment in usefulness must be made good if the plant is to function, and it is quite common to spend from year to year substantial amounts for repairs and maintenance. It is also common practice to immediately charge off to operating expense those items which have a very short period of usefulness, usually if they last less than one year, such as lamp globes, and certain types of tools, as well as those supplies which are directly consumed in service such as oil or gasoline.

"While it is not so obvious, it is nevertheless true, that larger items ordinarily called capital items are also consumed in the service. Pipes can be patched and poles can be stubbed, but there will come a time, however distant, when any unit of property must either be abandoned or replaced. It is this long-range deterioration or failure, as distinguished from impairment which can be made good by repairs or maintenance, which is referred to as *Depreciation.*

"There is another factor which is closely allied to, but actually different from depreciation. This is known as *Obsolescence,* and covers the case where a unit of property is abandoned because, due to advance in the art, its abandonment or replacement with a more efficient unit is economically desirable. For example, a steam electric generating plant built twenty years ago might still be running perfectly. However, a modern plant can generate at perhaps one-fifth the fuel cost of the older plant, and it is good business to scrap the old units and replace with modern equipment. Another example is the dismantling of our manufactured gas plants. When natural gas was introduced, these plants were no longer needed, although they were still capable of operation.

"It is often difficult to say whether depreciation or obsolescence has been responsible for the retirement of a certain piece of property, and it is seldom possible to say in advance that such and such a unit will eventually succumb because of the effect of one or the other factor. Therefore, for practical purposes, both depreciation and obsolescence are usually considered together, and the term "Depreciation" is ordinarily considered as including both factors.

"Once it is recognized that capital is itself consumed in operations as a result of its depreciation over a period of years and its final abandonment, it only remains to decide what is to be done about it. The thing that should be done is to estimate how long the property will last and to include a sufficient charge in yearly operating expense to write it off when it is no longer useful. By doing this the owner can protect himself by including in his charges for the articles he manufactures, or the service he renders, a sufficient amount to compensate for the depreciation his property suffers. Failure to do this is fatal to the business, as no concern can survive if it lives on its capital."

From time to time the information letters are reprinted to bring them up to date. Should an incidental change occur prior to reprinting it is covered in an accompanying note.

Results achieved from the use of this series of letters have been extremely satisfactory. Acceptance has been good and the faithfulness with which the questionnaires are returned has been gratifying. Experience indicates that several items contribute to the success of the program, namely, (1) the information is authentic; (2) the letters reach the employee in his or her home; (3) the return questionnaire requires careful reading of the material and (4) the information is sent out in small doses at reasonable intervals so as not to be burdensome.

EMPLOYEE INFORMATION LETTER

# 13 EVERY EMPLOYEE A SALESMAN

As an employee of Coast Counties Gas and Electric Company, your friends and acquaintances think of you as possessing certain knowledge of your company and its operation. They naturally feel that you are familiar with gas and electric service and the appliances in which they are used.

To the customers you contact in your daily work, in your own department, you are the company's own representative. And even though you are not identified directly with the sales department, questions arise every day bearing on some phase of sales, that demand accurate answers. In order to be in a position to reply to these questions and to present to the customer an appealing picture you must have on tap in your mind the basic facts about the company's service and about the appliances used for cooking, water heating, refrigeration and house heating.

Your conversations and discussions with friends and acquaintances and your contacts with customers offer almost unlimited opportunity for you to build customer good will and lay the ground work for the sale of additional equipment.

It is by imparting definite information to others about the company services in your many social and business contacts that you can lend your influence in the direction of load building - the adding of revenue volume to the system.

Thus it is that every employee is a salesman for the company.

## GOOD WILL

One of the primary objectives of your company is the gaining of customer good will. As an employee, you are a valuable part of the company's constant effort to reach out and develop an ever increasing amount of customer good will.

When a customer is fully aware of the complete dependability, economy, convenience, safety and other features of gas and electric service and understands their use to such an extent that a full use of them is demanded in home, office or factory - then we may say we have gained a full measure of customer good will.

When you understand this you will see the direct relationship between building customer good will and load building and you will see clearly how you fit into the picture, as a part of the company's effort to attain this end.

## WANT YOUR HELP

The sales department of your company specializes in load building. The results of their efforts are in-

# POSTWAR OPERATING PROBLEMS

## A round-table discussion by Northwest utility engineers

FOLLOWING the success of last year's engineering symposium by Northwest utility men, the same type of round-table discussion was participated in again this year at a recent Portland meeting of the Engineering and Operating Section of the Northwest Electric Light & Power Assn. Discussion centered around four general headings—providing for increased or shifting loads; rehabilitation of worn out and obsolete lines and equipment; changes and new procedure in operations and accident prevention.

### Increased or Shifting Loads

SECTION Chairman R. H. Jones turned the meeting over to O. L. LeFever, as discussion leader. LeFever said, "We realize that after the war there is apt to be a shifting of loads due to several causes. One factor likely to influence this is the hoarding of War Bonds and savings to be spent when civilian goods are again available. The release of this pent-up purchasing power will mean the purchase of many new appliances and the replacement of many worn-out ranges, water heaters, washing machines and all the smaller household devices. The subject was then thrown open to discussion.

*Mr. Ashworth* — As engineers, we should familiarize ourselves with the surveys being made by marketing agencies and other organizations, to indicate the trend of these pent-up desires of people. These surveys are showing that new homes and the furnishing of homes are among the first desires. Next comes automobiles and after that electrical appliances—ranges, refrigerators, radios and all other home appliances.

We as electrical people, seem to be very much in the people's minds, so far as pent-up desires are concerned. Any new or improved appliances will find their way onto the market in the postwar period. Heating and air-conditioning will be modernized and will provide a load that will improve load factors. Home refrigeration equipment, particularly the quick-freeze units, will be other improvements that we must be prepared for.

*Mr. Jones*—We know, too, that the tire companies, such as Firestone, Goodyear, General Motors and others, expect to go into the electric appliance merchandising business, through their tire dealers and auto dealers, which will change the distribution set-up on appliances that we had before the war.

*Mr. Quinan*—Puget Sound Power & Light company is going to survey its domestic customers to see what the trend of buying will be. Many large manufacturing companies are doing considerable planning. They have turned this planning program over to their high officers and to some of their best men.

The surveys in our own companies should show what the present situation is and what people have in mind for the future that may affect our distribution systems.

*Mr. Ashworth*—The town of Albert Lee, Minn., has made a very thorough survey of its population. This has been published in pamphlet form. The survey analyzes the manpower and employment situation and projects the job situation up through 1945 and to the first or second postwar year. Another part of the survey analyzes the intention of people to spend money, showing the amount to be spent and what for, and how it is to be financed.

We should tie in closely with any such survey that may be made in our own service areas.

*Mr. Setterstrom*—I was interested in an advertisement of the Puget Sound Power & Light Co. directed to farmers who do not now have service. These prospective customers were asked to report where their farms were and if they wanted service and for what it would be used. The objective for the company is said to be 100% coverage of farms in the company's service area.

*Mr. Quinan*—We haven't had time yet to tabulate the response to this advertisement. We already serve a very high percentage of the number of farms in our area. I doubt that a company serving a sparsely settled farm area would do this kind of advertising.

*Mr. Hellenthal*—The work of the engineers in readjusting their plants to take care of shifting loads will have to wait on the surveys made by the business department.

Many of the new population in our area are here temporarily in war work. Indications are they are not saving much but are spending what they get.

*Mr. Emery*—Our job will be to sell kilowatt-hours to the people who have saved up for after-the-war purchases. There will be a scramble for the postwar dollar. Many other lines will be actively selling and competition will be keen.

We should get out and help the salesman of appliances to make his

### Around the Table

**R. H. Jones, *Idaho Power Co.***
**O. L. LeFever, *Northwestern Electric Co.***
**Paul P. Ashworth, *Telluride Power Co.***
**George Quinan, *Puget Sound Power & Light Co.***
**R. C. Setterstrom, *The Montana Power Co.***
**Joe Hellenthal, *Puget Sound Power & Light Co.***
**J. F. Emery, *Idaho Power Co.***
**D. A. Hord, *Northwestern Electric Co.***
**C. E. Klaus, *Westinghouse Electric & Mfg. Co.***
**J. C. Henkle, *Portland General Electric Co.***
**A. L. Pollard, *Puget Sound Power & Light Co.***
**L. R. Elder, *General Electric Co.***
**W. P. L'Hommedieu, *Westinghouse Electric & Mfg. Co.***
**Corbett McLean, *Northwestern Electric Co.***
**R. C. Martin, *Pacific Power & Light Co.***
**Paul B. McKee, *Pacific Power & Light Co.***
**C. E. Cannon, *The Washington Water Power Co.***
**John Bankus, *Portland General Electric Co.***
**C. F. Myers, *Puget Sound Power & Light Co.***
**A. H. Beckwith, *The Washington Water Power Co.***
**C. P. Osborne, *Portland General Electric Co.***
**W. A. Leidigh, Jr., *Portland General Electric Co.***

work effective, so our companies can in turn sell the kilowatt-hour. We can't just sit around and think we are going to build lines after the business comes to us. We, as companies, will have to get out and get the business.

*Mr. LeFever*—Other factors effecting the shifting of loads will be the shifting of populations and the changes in customers habits. We might profitably discuss this phase of the problem.

**Population Shifts**

*Mr. Hellenthal*—In Seattle, we figure that only about 25% of our new population is going to stay in the area, and their staying will be contingent on their getting jobs.

*Mr. Quinan*—We are trying to find the truth about this situation. Our survey is designed to get a line on the placement of the load for each substation area. We are trying to find out what load is permanent and what is merely temporary because of the war.

*Mr. Hord*—We feel that we will lose a good percentage of our new industrial loads. Our warehouse will be full of transformers taken from these lost loads. We can use some of these for the new domestic load that we expect to increase.

*Mr. Klaus*—The public is likely to become interested in electric house heating, and I believe we should be giving some study to this problem.

*Mr. Quinan*—With reference to the changing habits of our customers, our survey is going to attempt to find out what these changes amount to.

With respect to the industrial load in our area, much of the new housing project load and shipyard load in Seattle is being supplied by City Light. Our own industrial load has not increased so very much. We are consulting with the executives of the industries and commercial establishments we serve, to find out what their plans are and what they are going to do.

As to house heating, both our company and City Light have had unfortunate experiences with this.

**Shifting of Peak Loads**

*Mr. LeFever*—The change back from war time to standard time and the probable loss of the staggered hours on commercial and industrial working schedules, and the change back to one shift of work instead of three shifts, will likely cause a substantial increase on our peak loads on our power and lighting feeders.

*Mr. Henkle*—One note of caution about house heating is that some houses properly designed for electric heating will give you very good operating characteristics and good results to the customers. Other houses not adapted to it will produce the opposite results. We have made tests on some of our installations.

With respect to our peak, we have found that under present conditions, with people working swing and graveyard shifts, we get peaks at most unusual times. I believe that after we stop working three shifts we will go back to the same kind of load curve we had before.

*Mr. Pollard*—When we went from standard time to war time, and at the same time dimout regulations went into effect, we had a marked decrease in peak.

*Mr. Quinan*—Before 1942 we had an evening peak of about 45,000 kw. This peak has practically disappeared. The morning peak, which was about 40,000 kw. lower than the evening peak, is about the same as formerly, which makes our system peak now fall in the morning, and a further effect of the change has been to extend the length of this morning peak. In 1943, with the lifting of the dimout, our peak shifted back to evening, in November and December, and the duration of it was shorter.

**New Loads**

*Mr. LeFever*—New loads for new and improved appliances will be coming on and we might hear from the manufacturers on this point.

*Mr. Elder*—The manufacturers are much interested in having the utility companies promote load building for the obvious reason that it makes more business for us.

Some of the new devices to come on the market soon after the war will be the quick-freeze units for homes, television and air-conditioning.

We believe the public will spend more money than formerly for conveniences, and this desire or intent on the part of the public will make it easier to build electric loads.

I would comment in passing on extending service to rural areas. The REAs have done a great deal of line extension and not many of them have gone broke.

*Mr. L'Hommedieu*—Many new devices have been developed for war use that are still very much "hush hush." Some of them can be converted to peacetime uses such as radar and the stabilizer.

Planning for the engineers here means to find out what loads we are going to lose and how we are going to build these loads back. Some of the peacetime uses of power that will help build it back are new applications of electric heat in industry, electronic applications, high-frequency heating, infra-red drying and air cleaning. Many small power uses have a value to the users totally out of proportion to the cost of the electric service.

An interesting survey was made in the San Joaquin Valley. They plotted every acre of improved land with crops, showing the amount of irrigation needed per acre and reducing this to the load per acre, and cost. They then plotted the unimproved land, made soil tests to find out what it was suited for and calculated from the known facts what irrigation load was needed to bring this land into production.

In our company we have a new products division now to find out what new products can be produced. We are not overlooking the domestic field.

Much industry is now working under high foot-candle lighting intensity. This will stimulate lighting development not only in industry but in homes as well.

A survey in Mansfield attempted to find the probable five-year value of purchases after the war as compared with the last prewar year. All estimates in this survey were up.

Back east there is a better homes department. They are looking way beyond the 10,000 kwh. mark per year. The postwar period certainly presents a challenge to this industry.

*Mr. Jones*—We expect a development in highway lighting. The Highway Commission of Idaho is considering the beautification of highways and we believe they are ready to incorporate some lighting. They expect to get some federal money for such improvement.

*Mr. Elder*—Highway lighting is going to increase by leaps and bounds, not so much for beautification as for economy. There is a $250,000,000 loss per year on our highways that could be reduced 50% by proper illumination. We should talk it up from the standpoint of economy.

*Mr. Hellenthal*—A committee in our company is making a study of the probable system load for a five-year period. Are other companies doing this?

(Apparently no other companies were making such a study at this time.)

*Mr. McLean*—In reference to house heating, we may find the public wanting to put pressure on us. Studies are being made on the reverse refrigeration cycle. If you can get a three to one ratio, you can heat with it for a comparatively small load, say 5 kw. for a small house. In cold weather, however, the heat ratio will drop to one and one-half to one which increases your load to 10 kw. This increase will fall right on the peak when the sun goes down.

*Mr. Martin*—There is a new hop picking machine in the Yakima Valley that may develop. It is a three-phase

device requiring 20 to 30 hp. It will have a seasonal use of about five weeks per year. The farmer is an individualist. He is not interested in increasing employment.

Small a-c welders will also be used on farms, about 13 kva. If a farmer can avoid a trip to a shop in town with a one-hour wait while his equipment is being repaired, he will be justified in using his own welding machine on his own farm.

These devices mentioned are not particularly satisfactory load for us but there may be a demand for serving them on farms.

## Obsolete Equipment

MR. LEFEVER — There will be a problem in rehabilitating worn out and obsolete lines and equipment, and we are wondering whether this will be done by a general replacement of equipment or by repairing the old equipment.

Another point under this heading is whether we will build unattended automatic and supervisory controlled equipment in places where major replacement and rehabilitation are required.

*Mr. Ashworth*—We will have to examine each case of repair vs. replacement and decide it on its merits.

As to the second point raised by Mr. LeFever, we will be between two millstones. There is a shortage of manpower now, but after the war there will be our obligation to the returning service men looking for jobs. Yet the automatic station may be the most economical and will tend to keep the cost down to the public. We will have to keep these factors in balance in any program contemplating automatic operation.

*Mr. Jones*—It would seem that, for a long-range program, we must look forward to a modernization of equipment, and a trend toward automatic operation.

*Mr. McKee*—This seems to me to be a matter of timing. We ought to avoid throwing people out of work during the transition period. After this period is over and labor conditions become more stable, we can consider the economies of the situation and put them into effect.

### Communication-Dispatching

*Mr. LeFever*—We will undoubtedly have changes in operation due to developments in the art as, for instance, improved dispatching and emergency repairs by modern communication facilities, such as carrier and radio.

*Mr. McLean*—Portland General Electric Co. is supplying communication service to our company which has now acquired some transmitters for short-wave radio communication. Portland Gas & Coke Co. has also purchased two transmitters, and all three companies are now using Portland General Electric equipment.

*Mr. Hellenthal*—The Puget Sound Power & Light Co. has a couple of mobile units but has not set up a dispatching network.

*Mr. Leidigh*—We want 15 more mobile units and our problem is whether to go to FM or AM. The FM seems to give better results but the WPB won't let us change our fixed stations. We should change the whole system over in order to get the most effectiveness.

*Mr. Cannon*—We work jointly with the local railroad system using AM equipment which has been quite valuable in emergency dispatching.

We now have a fairly well completed telemetering system. This is the greatest aid to dispatching we have ever installed. We couldn't run the power pool without it. We should consider this development in our postwar planning for improved systems.

(In answer to question) Yes, we use carrier in this load control equipment on our 110-kv. system.

*Mr. Leidigh*—Our fixed station is on 2,292 kc. We have been able to impose this on our transmission system. The service cars hunt the transmission lines to get the signal. It works quite well.

*Mr. Elder*—It is a headache to run FM and AM together. We have tried running AM and FM on the same frequency but it didn't work well. The company making this trial is going to change over from AM to FM. There is an expense of $400 or $500 per car for this changeover.

## Service Standards

MR. LEFEVER opened the subject of postwar as compared to prewar service standards, respecting continuity of service and voltage fluctuation.

*Mr. Bankus* — Our postwar service standards should certainly be no lower than before the war and we should be able to improve them. We should also attempt to reduce the costs. One way to do this would be to make greater use of networks than we have in the past.

*Mr. Myers* — A problem in voltage regulation will be to spend money for regulation only when it is justified. Fuorescent lighting may change our ideas on voltage regulation. The EEI Transmission and Distribution committee went into the question of voltage regulation with NEMA in the matter of designing electric appliances. This committee pointed out that undue expenditure for regulation is not justified. For instance, electric ranges do not require the voltage regulation that lamps do. A small portion of the appliances in use need a close voltage regulation.

In our postwar planning we are going to start at the utilization end. taking farm, commercial and industrial, and trying to set up a maximum and minimum voltage for certain classes of service. There is no problem in our underground and our new overhead primary network gives good regulation with small cost. Regulation is inherent in the network system, but the bulk of our system is radial, and regulation is far from inherent in that system. Possibly our aim in the past has been too high, and in the long run the consumer pays for it.

*Mr. Jones*—At several of our past meetings we have had discussions of rural service and have striven for voltage standardization. We have 50% saturation of cooking on our rural lines. These customers are just as critical of interruption as city dwellers. We can't overlook criticism of voltage standards.

*Mr. Quinan*—Why should there be any difference in our service standards after the war? Our problems will be the same as we had before the war. The war has simply intensified the old problems.

### Service Calls

*Mr. LeFever*—Many of us have cut down our service departments during the war due to shortage of manpower. What can we expect in the postwar period so far as customers service is concerned?

*Mr. Jones*—We had to educate our customers, particularly rural customers, that we could not now continue "fire department" calls. We now route our service calls. Our customers accept this situation but what will they expect in the future? Possibly we can continue to eliminate the "fire wagon" calls in rural areas.

*Mr. LeFever*—We have zoned our service calls and it has saved us a lot of money. As far as servicing appliances is concerned, we have been getting out of this business, believing that the one who sells the appliance should service it.

*Mr. Martin*—When we were maintaining service on appliances, we used to do a better job for less money than the service shop can do. When we tried to raise our price, commensurate with the cost of rendering the service, the customers didn't like it.

*Mr. Jones*—The department stores in our larger towns maintain repair service for ranges and refrigerators.

We feel we have maintained good public relations by servicing all the equipment we have sold. We do not intend to get out of the service business.

We expect to have to merchandise again in parts of our territory where we do not have good dealer coverage or where we may have particularly strong bottled gas competition.

*Mr. Beckwith* — We have stopped servicing washing machines and refrigerators, but we still service ranges. The service man leaves a post card to be checked by the customer, indicating whether the necessary service was completed. We have had very little criticism.

*Mr. Henkle*—We used to do all the servicing of ranges in Portland as a necessary adjunct to selling. Much of it was free service and we cut this to furnishing free labor only. Lately we have been charging for all service and covering our costs. Now we just service ranges and water heaters in an emergency, and we make a charge for it. We have about $40,000 in range repair parts in our store room.

## Accident Prevention

MR. LEFEVER—We have not given consideration in recent meetings to accident prevention. It appears we may have a postwar problem in this field, with the thought that we will have to put on many new men.

*Mr. Osborne*—We have had a safety engineer for three years. We recently appointed a committee to draw up a set of safety rules for the company. The state code is too long to read. The new book of company rules is only 14 pages and all of the rules can easily be lived up to. A recent check showed that only one bad accident we have had would have occurred if the rules had been lived up to.

Generally we go into too much detail. It is the small accidents due to carelessness that add up.

*Mr. Ashworth*—We have not had much activity in accident prevention work in recent years on account of being so busy, but neither have we had any serious accidents. Recently we have started to revive our accident program. We reviewed the safety rules, first aid, and took up other safety problems. After the meeting an experienced man got into a hot 5,000-volt line and was killed. He had worked on these lines for 15 years.

It seems that the more pressure we put on accident prevention, the more accidents we have. I don't know what the answer is, and if somebody has a little book to solve the problem, we want a copy.

*Mr. LeFever*—The foreman is the key man in accident prevention. He watches the men work and can help them avoid accidents.

*Mr. Henkle* — The selection of a safety engineer by management will not solve the problem. No one can make our operations simple and safe.

Accident prevention is just a part of your operation. The minute you set it off by itself and expect it to solve your problem, you will be disappointed. You have to instill safe working methods into the whole organization.

*Mr. LeFever*—That is true. You have to keep every individual safety minded. A safety minded foreman is a big help.

*Mr. Jones*—Our safety director is now planning against the time when he will be hiring many new men. He has been plotting curves of years of service against the number of accidents. We find we get a peak of accidents after a man has been working 11 months to one year. Apparently in the first 11 months he is careful and has hardly any accidents. Evidently this is a case of "familiarity breeding contempt."

When a man starts work, the foreman should watch him closely and keep him working safely.

*Mr. Klaus*—I have noticed that the duPont people at Hanford are quite safety conscious. They have safe working rules and are very strict about firing anyone who violates them. They have had very few serious accidents.

**Communication problems were live topics at Northwest engineering meeting. This 1/2-watt walkie-talkie with companion 6 1/2-watt mobile unit is being used by Northwestern Electric Co. for dispatching and trouble shooting. Directing dredging oprations in the vicinity of submarine cables is an important use**

# LOAD, POPULATION FORECASTING

## Per capita consumption proves most accurate estimating criterion

**J. D. ENEFER**
**Southern California Edison Co.**

WE read in the Book of Genesis that Joseph prospered and waxed powerful in the land of Egypt through his accurate long-range prediction of crop conditions. This is believed to be the first recorded successful weather and business forecast, and indicates that Joseph had probably made somewhat of a study of the vagaries of the River Nile and of weather cycles. Throughout the succeeding thirty-six hundred years, men have attempted, in one way or another and with varying degrees of success, to see into the future, and history is replete with records of their forecasts. Of the thirty-nine books of the Old Testament, fifteen are books of prophecy.

The only tool of many of these early forecasters was a crystal ball, but the invention of the printing press, and later the calculating machine, has provided the modern forecaster with vast accumulations of historical data and with mechanical mathematical approaches to forecasting problems. Nevertheless, while statistical approaches to such problems are invaluable as guides, the final answer must always be tempered by the experience and judgment of the forecaster. It is with this understanding that the following brief outline of one possible approach to the forecasting of electric utility loads on the West Coast, as a basis for effective system planning, is presented.

The demands upon any utility for electric service will be, in general, dependent upon, first, the number of inhabitants in the area which it serves; secondly, the degree to which the desire of the inhabitants for electric service is developed, which may be termed the degree of their electric appetency, or literally their electric appetite; and lastly upon the ability of the industry not only to provide the means for satisfying such appetency, but also for stimulating it further.

Forecasting electric loads is particularly difficult at the present time because of the inordinate effect of the war upon these loads, and more particularly because postwar loads will depend upon many factors impossible of accurate prediction at this time. Nevertheless, it is possible to arrive at some tentative conclusions as to what the postwar era may hold for our business. This is possible because exhaustive research has developed certain fundamental facts regarding human behavior which have important bearings upon our problem. These may be stated as follows:

1. Mass movements of people and mass tendencies in human behavior are not easily nor quickly changed. There is too much inertia in the mass. Such tendencies may be temporarily diverted or "pulled off the trend", but they will in general tend to return to their previous trends as soon as the diversionary influence is removed.

2. With the exception of those dependent solely upon nature, all economic developments and changes are dependent upon the number and behavior of people.

3. As long as the economic and social influences remain essentially the same within any spatially defined area, the population growth in that area will follow a cycle pattern that is accurately predictable. If the economic and social character of the area changes such as from a pastoral economy to an agricultural, or from an agricultural economy to an industrial, a new growth cycle will commence which will also be predictable as soon as its early pattern is definable. Relatively speaking, such changes take place slowly, and to the careful observer their advent is evident considerably before they become a *fait accompli*.

4. Industrial development and population growth, at least in modern times, go hand-in-hand and, from our immediate standpoint, it is not particularly important which comes first, the chicken or the egg.

To the foregoing may be added one of the fundamental laws of economic philosophy, namely, that good tends to follow good, and bad to follow bad. Let us examine the effects of the foregoing upon our problem.

First, the centuries-old migration pressure from East to West is still functioning, and hence a further sizable population growth on the West Coast appears to be probable. Furthermore, conditions have been conducive for people and industry to move to the West Coast in years past. These conditions invite further migration both of people and of industry. Secondly, since industrial development and population go hand-in-hand, and since we now have a large industrial investment in men and dollars, a measure of our population should provide some guide as to our probable future industrial development and resultant use of electric energy. This statement must hold unless we wish to concede the possibility of a very large migration out of this area, a concession which would be in contravention to both local experience and well established biologic and economic trends. Thirdly, the mass trend for more and more use of electricity, both in the home and in the factory, persists in spite of temporary set-backs from business depressions.

To illustrate, the annual per capita kilowatt-hour sales of energy for domestic purposes in the territory served by the Southern California Edison Co. were 188 in 1930 and, in spite of the depression, had risen to 232 in 1937. In the same area, the annual per capita industrial power sales were 396 in 1930, and 450 in 1937.

### System Planning

Effective system planning should develop a program which will:

1. Provide additional generating capacity of the right type, in the right location, at the right time, and neither too soon, too little, nor too late.

2. Provide for the orderly development of the distribution and transmission system in such a manner as to attain the optimum load or use factor on each of the component parts of the system.

3. Provide a coordinated sales program which will first, load those parts of the system not fully loaded; secondly, improve the system and local load factors; and finally, insofar as com-

patible with the foregoing, add load which will produce the highest net revenue.

4. Provide a sound basis for management to effectuate a coordinated and economic financial program.

The inclusion of sales and financial programs in the foregoing may be a new idea to some, but a little thought will make it evident that they are inseparable parts of any really effective planning program.

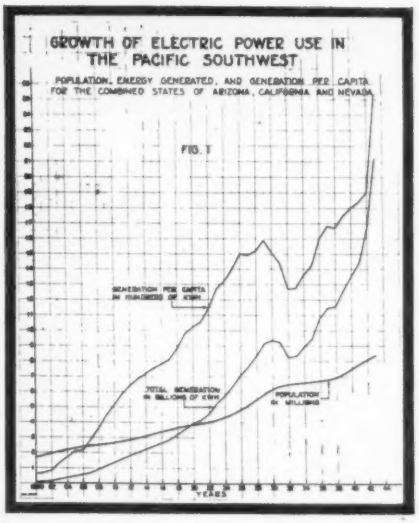
During the three decades from 1900 to 1930 the electric utility industry grew at a tremendous rate, particularly along the West Coast. We should, indeed, salute the pioneers and early planners of our industry for the remarkable job which they did under pressing circumstances and with practically no industry experience to serve as a guide. Nevertheless, during this period competition from other sources was not too keen, revenues were mounting rapidly, and mistakes in system planning were generally covered up by the rapid growth, and it was not until the depression of the last decade that some of the mistakes began to show up, and utilities found themselves burdened with some unnecessary investments.

During the present war period we have all learned a great deal about the load carrying capacity of the component parts of our system. With the keen competition which we will face in the postwar era, both from other power sources and from government financial systems, plus the heavy tax burden which we must carry, our managements face the problem of making every dollar of investment produce the maximum return. Only coordinated system planning can accomplish this objective.

### Planning Requirements

In order to meet the requirements of a system planning program of the kind just outlined, it is necessary to develop load and revenue estimates not only for the system as a whole, but also by load classes and by sub-areas of the system. The selection of the latter will be dependent upon each utility's organizational arrangement and upon its method of recording sales and revenue data.

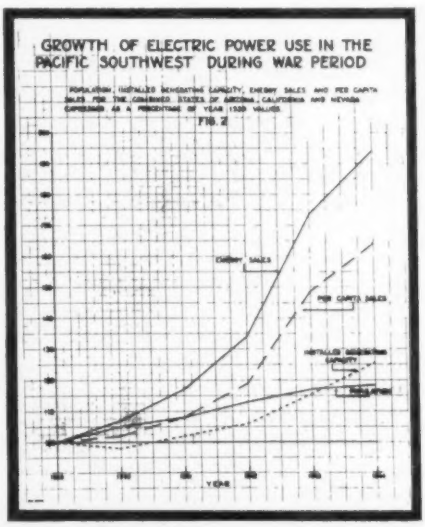
The units most commonly used for measuring the electric appetency of a utility's customers have been annual sales per customer and per connected horsepower, the latter almost entirely for power loads. While valuable for other purposes, and at times as a check on final load estimates, these units are in general unsatisfactory for load forecasting, particularly long-range forecasting, for the following reasons:


GROWTH OF ELECTRIC POWER USE IN THE PACIFIC SOUTHWEST
POPULATION, ENERGY GENERATED, AND GENERATION PER CAPITA FOR THE COMBINED STATES OF ARIZONA, CALIFORNIA AND NEVADA
FIG. 1
YEARS

First, they both interpose another step in the process of relating load to population with the consequent possibility of computing errors. Secondly, they are the subject of sharp variations and are too easily affected by extraneous factors. For example, during the war domestic use per customer has risen sharply in some areas, due not so much to an increase in popular demand as to housing shortages which have forced increases in the number of people per customer. Lastly, neither unit is applicable to all classes of load and relates population and individual electrical appetency directly to utility loads.

It is readily conceded that very large loads such as electrochemical reduction plants may greatly distort per capita use data and such loads should be deducted and handled separately. Trends in per capita use will be found to vary much less sharply than trends in other electric-use measuring units.

Referring to Fig. 1, which shows the growth of electric power use in the combined states of Arizona, California and Nevada from 1900 to 1943,




inclusive, attention is directed particularly to the top curve which represents the annual per capital generation of electric energy based on the total area population in each year. The per capita growth prior to 1915, as shown on the chart, is therefore a measure of the mass demands of people during those years, but not of individual demands, since a large part of the growth in per capita use during that period resulted from extending service to a larger proportion of the population each year.

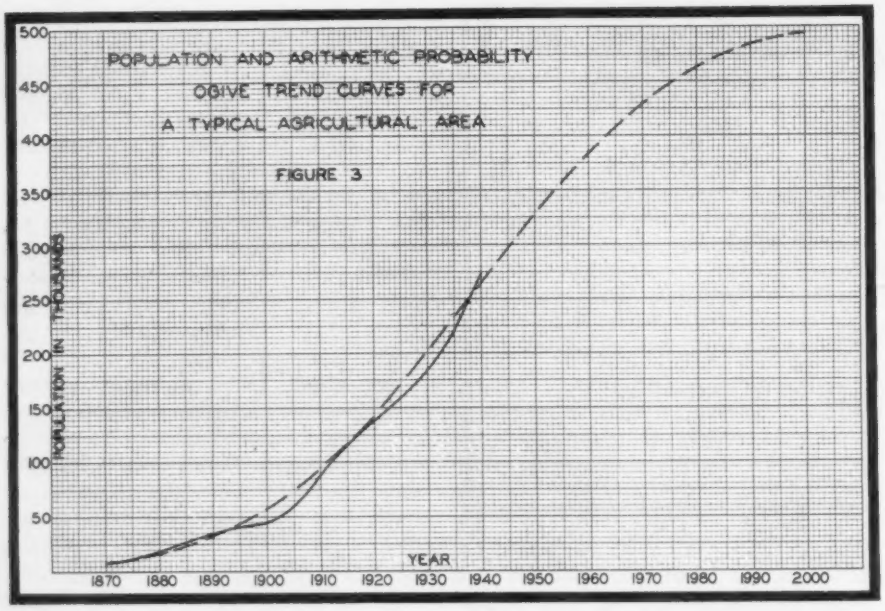
By about 1915, however, a very large proportion of the population was receiving electric service and the growth in per capita use since that time has been mainly due to increased individual demands. Particular attention is directed to the fact that, while the depression of the last decade caused a substantial drop in per capita use, immediately upon the commencement of an upward trend in the business cycle the per capita use of energy swung up sharply, passed the 1930 value, and headed for the point towards which it was trending before the depression commenced, all of this before the real beginning of our war effort. This point is important, namely that the per capita use value not only recovered the net loss sustained during the depression, but also tended in effect to recover the time lost.

The heavier line at the bottom of Fig. 1, which shows the growth in population, is of interest as it shows the depressing effect on the original population cycle produced by the business retrogression of the last decade and indicates the probability that a new cycle started in 1938, possibly heralding a change in part of the area from a predominantly agricultural economy to an industrial economy.

The growth of electric power use in the same area during the war period, including estimates for the year 1944, is shown by Fig. 2, where the data are expressed as a percentage of the 1939 values. Of particular interest in this connection is the fact that, while the population increased 18.5% between 1939 and 1944, per capita sales increased 64% and total sales increased 94%; all this increase has been handled with an increase of only 25.5% in installed generating capacity. This has been possible only through the cooperative pooling of the resources of all the utilities and by heavier loading of utility systems.

### Population Growth Theories

Volumes have been written on the subject of population growth, and many theories and methods have been advanced for making both future and




intercensal estimates. There is one population growth theory, however, which is becoming more and more generally recognized as having a sound biological basis. This is the theory that population growth occurs in cycles and that, within any spatially defined area and under relatively stable economic and sociological conditions, the growth in any one cycle will start slowly and increase at a gradually increasing rate per increment of time until the mid-point of the cycle is reached, after which the increase per increment of time will become steadily smaller until it reaches zero at the end of the cycle. Any major change in the economic or social character of the area will result in the commencement of a new cycle. Minor economic or social changes may slightly alter the cycle by raising or lowering the upper asymptote, but the general curve will remain the same.

The biological growth theory was first popularized by Professors Reed and Pearl of Johns Hopkins University and, for a detailed explanation, the reader is referred to the latter's book entitled *The Biology of Population Growth*, first published in 1925. Briefly the population growth curve developed by this theory is a logistic or ogive curve resembling an elongated letter "S" leaning to the right. Professor Pearl demonstrated that, if a few points on a population curve are known, the entire cycle may be predicted by fitting a curve of the ogive type to these points. The remarkable accuracy of this method has been proven by numerous checks against known growth curves of cities, counties, states, and countries.

Referring to Fig. 3, the solid line shows the population growth of a typical agricultural area served by the Southern California Edison Co. It is perfectly feasible to construct or fit to this known part of the growth curve of the area a curve which will cover the entire period of this population cycle, from the lower to the upper asymptote, by using the formulas devised by Verhulst, Pearl, Gompertz and others. If the time is available, this will prove interesting and will produce the most accurate forecasts. However, there is an approximation of the true fitted curve which can be quickly and easily made, and which will generally be sufficiently accurate as a trend indicator for our purpose.

A study of the population growth curve of Fig. 3 indicates that the increment rate of growth of the current cycle in this area probably reached a maximum about 1938. Assuming this to be true, then the 1938 population represented 50% of the upper asymptotic limit of the cycle, and the 1870 population was approximately 1.5% of the asymptotic limit. Plotting these two values on arithmetic probability paper as shown by Fig. 4, and drawing a straight line through them, the percentage which the calculated population of each year is of the asymptotic limit can be read directly. For comparison, the dots on this chart show the percentage of the calculated asymptotic limit that the actual or observed population was in each census year.

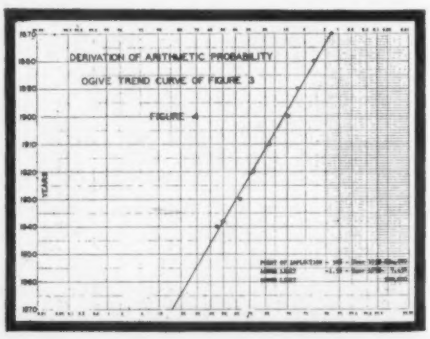
Converting the percentage values of Fig. 4 to calculated population values and plotting them on Fig. 3, gives the dotted line shown on that figure. With allowance for the deviations from a smooth curve generally found in population curves, the calculated ogive cyclical trend curve will be seen to fit the historical data reasonably closely.

While the illustration used is simple, it will be found relatively easy with a little practice to construct an ogive curve by this method, which will fit quite closely any given population curve. It is not necessary, of course, to find the year in which the population has reached 50% of the ultimate. The area may not yet have reached that point. Some areas may be found to have only reached 30% of their probable population by 1940, while others will be found to have passed the 50% mark in the early 1920's. It should be understood that the method outlined is only intended to give an approximation which will, in general, serve satisfactorily for load forecasting purposes. For accurate cyclical estimates recourse should be had to the Pearl or similar formulas, particularly if an accurate estimate of the ultimate or upper asymptotic cyclical limit is important, as the latter value may vary considerably from that obtained by use of a fitted logistic curve. Furthermore, these trend curves will hold reasonably true only as long as the economic character of the area does not change importantly. However, with the exception of a few rare cases such as have occurred under the pressure of war demands, changes in the economic character of a given area occur relatively slowly.

### Intercensal Estimates

Having established a long-term trend curve, the next step is to estimate the population for the next two to five years. To do this, and also to provide population data for computing the historical per capita use of energy between census years, it is necessary to make intercensal estimates. Many methods have been devised for making such estimates. Telephones, electric, gas and water meters, automobile registrations and, more recently, ration book registrations are some of the indices which have been used either alone or in combination. All of the foregoing, however, have some serious objections.

There is a method, however, that makes use of elementary school ADA, or average daily attendance, which was worked out by Paul Lane, formerly



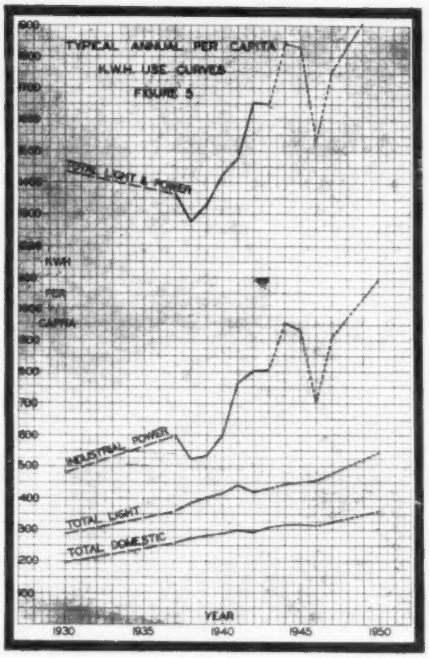
with the California Taxpayers Assn. and now with the federal government in Washington, D. C. This method is predicated upon the fact that elementary school attendance is compulsory in California. The ratio of elementary school ADA (or in some cases enrollment) to population in the census years is first determined. This ratio is then adjusted in subsequent years by a factor which accounts for changes in the ratio of births to deaths. Multiplying the adjusted ratio for any year by the elementary ADA in the same year gives the estimated population in that year. The method has the advantage that it can be used for relatively small areas since the ADA is published by school districts but, like any mechanical method, its application requires judgment and sometimes adjustments to meet local conditions.

Having made estimates for the years since the last census, the completion of the estimates for the next five or ten years is obtained by drawing a curve from the last historical year to some point on the ogive trend curve. A knowledge of local conditions and a study of immediate trends are the prime requisites for estimating these short-term trend curves. Such curves should intersect the ogive trend curve at a tangent at a not too distant date, in most instances within a ten-year period.

It will generally be found advisable to first estimate the population of each county in which the utility has service, then break these county estimates down into the desired subareas. Judicial townships, census tracts, voting precincts, and school districts will all be found useful as a basis for subdividing the county estimates.

### Annual Per Capita Use

Having completed the population estimates, the calculation of the historical annual per capita use by load classes becomes a matter of simple arithmetic. If available, per capita data back to 1920 is usable, but beyond that is not of much value. It will generally be found not even essential to compute per capita values for every year prior to 1937. In any case, each utility should select the years prior to 1937 best suited to its conditions, but should include the census year of 1930. Data for the depression years of 1932 to 1935 are interesting and serve to illustrate the persistence of per capita values in returning to original trends as soon as adverse conditions are at all relieved, as well as perhaps also as some indicator of the percentage decrease which might occur in some load classes in the event of a postwar business depression.



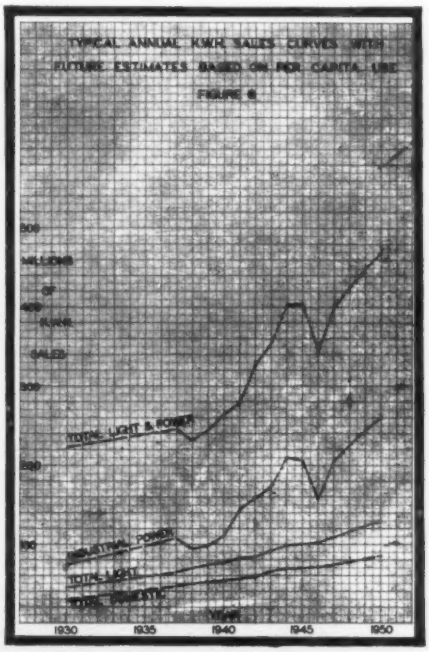

For comparative purposes, all historical data should be on the same basis. For example, if the area served changed at any time, the estimates of population should be adjusted accordingly so as to represent in each year the population actually served in that year. Furthermore, any large temporary loads of prior years should be deducted as, for example, large blocks of power used for two or three years in the construction of some unusually large construction project such as the Metropolitan Water District Aqueduct in southern California.

As previously pointed out, per capita and total load estimates should first be made by load classes and preferably by subareas, and then combined to give the estimated total system load. The same applies to the revenue estimates. It will generally be found that all load classes except industrial power and oil power can be handled by direct analysis of the per capita trends. Some exceptions to this may be necessary, as for example where large government war loads have been added under classifications such as "Light and Power Sales to Other Public Authorities." In these cases, such loads should first be deducted and separately estimated, and the per capita values calculated both with and without these loads.

In handling industrial and oil power loads it will generally be found advisable to calculate the per capita values both before and after deducting any very large war loads, such as aircraft plants, shipyards, aluminum reduction plants, etc. These unusual loads will, in general, require special separate consideration. However, it is important that they be added again after they have been adjusted to peacetime levels, before estimating the total industrial power postwar trends.

No set procedure can be laid down for estimating the postwar drop in these war loads. Estimates must be based on best judgment after consulting available competent authorities. However, postwar adjustments of these large loads should not be such as to distort too much the long-time trend in per capita industrial and oil power use.

In estimating the future per capita trends by load classes, various devices can be used as a guide. One excellent device is the least squares method. In using the latter, years in which the per capita values are obviously abnormally distorted as the result of some special condition existing in that year should be omitted from the calculations.




### Use of Data

Fig. 5 shows graphically typical historical and estimated future per capita sales data for four of the load classifications in one subdivision of the Southern California Edison Co's. service area. This particular area includes one large cement plant, a steel mill, a number of small industrial plants and an important agricultural area, together with a number of military establishments. The diverse effects of these different loads is reflected in the total light and power per capita curve. The decrease in total per capita sales between 1930 and 1937, as shown by the curve, resulted from a substantial drop in per

capita agricultural power sales during this period, the curve for the latter not being included on the chart. The resultant kilowatt-hour sales obtained by multiplying these per capita values by the population of the area, are shown by Fig. 6.

Having estimated the future sales, estimates of the resultant load on the distribution substations in each area and at generation may be obtained by multiplying the sales estimates by the distribution and total system loss factors respectively. Since the data are by load classes, it is also possible to estimate the shape of the combined consequent demand curve at the distribution substations by constructing typical daily, monthly and annual load curves for each load class, and combining them to give the total area load curves. These may then be plotted on a graph together with the distribution substation transformer capacity installed in the area, and the area distribution system load carrying capacity. The latter is the total practical line capacity of circuits feeding out of the distribution substations serving the area.

Loads fed at transmission voltages must, of course, be deducted before comparison with the distribution system capacity. Some allowance must be made for duplicate lines installed to protect against line outages and insure reasonable continuity of service, and also for some unavoidable unbalance in the loading of the circuits in any area. Nevertheless such a graph will indicate whether or not the general distribution system loading and use factor are abnormally high or low and in general whether or not additional load could be handled in the area with little or no additional distribution investment. In other words, loaded areas and those which could easily handle additional load will be definitely indicated, as will be the probable time when additional distribution investment will be required.

With the foregoing data, the distribution organization can proceed with more detailed studies and lay definite plans, the system planning engineer can plan transmission system and generation additions, and the sales organization can plan a campaign designed to load idle distribution capacity and to improve local and system load factors.

### Revenue Estimates

There remains just one more step in our forecasting program, namely, the estimating of that most important factor, the dollars of gross revenue. With data available by load classes, the calculation of revenue in mills per kilowatt-hour load classes is purely a mechanical job. Trends in these data can then be analyzed and forecasts made in the same manner as per capita sales trends. Moreover, per capita revenue can be calculated. The latter will be found of value as a measurement of the share of the customer's dollar which the company is obtaining and for comparison with various national and local data such as per capita income, etc. While revenue forecasts can be made from the total system data, building them up from subarea forecasts will be often found of value.

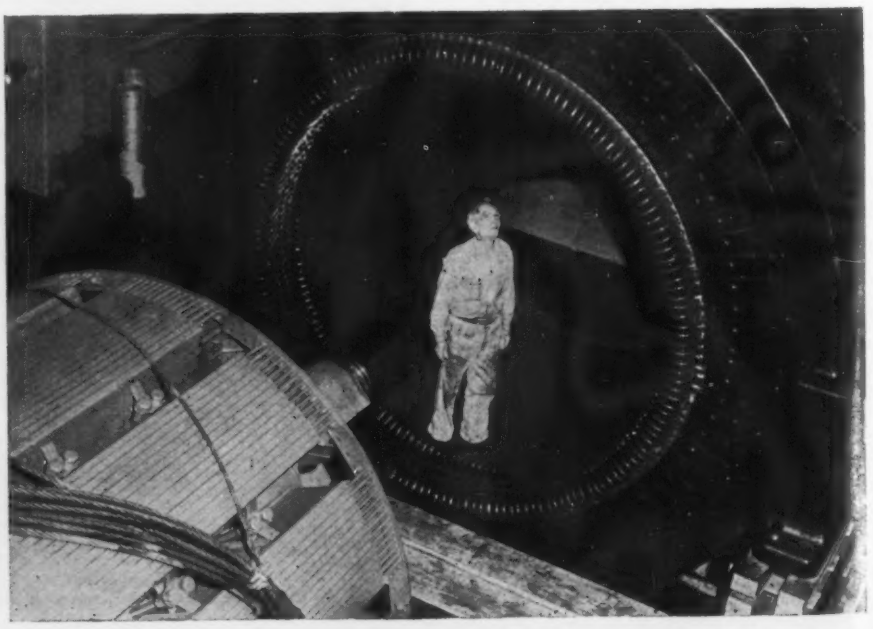
With the foregoing data, the management can be given forecasts of gross revenue and probable investment requirements which will prove invaluable to it in mapping its future financial program. While an attempt has been made to outline a practicable system load forecasting method, it is suggested that the crystal ball be retained and kept well polished. It probably will be needed on occasion.

# MODERNIZING ROTATING EQUIPMENT

UTILITY engineers, as they think more and more in terms of postwar, are turning their attention to the obsolete equipment problem that will confront them. They do not know whether solution to the problem will be a general replacement program or the modernization of old equipment. O. A. Gustafson, General Electric Co., in presenting a paper before both north and south engineering section meetings of the PCEA, recommended a studied and planned approach to the problem. He used three cases of rotating equipment modernization as typical examples of what can be accomplished and suggested some blueprinting be done. His paper will appear in full in ELECTRICAL WEST for July.

In discussing the paper, E. W. Morris, Westinghouse Electric & Mfg. Co., stressed the point that insulation is the life blood of a machine and that all large manufacturers have for years been working to develop new materials which will permit higher operating temperatures. He suggested the advisability of companies checking their stocks, stating that many have spare coils which could be sent to the manufacturer and modernized with new insulation in preparation for the time when it is desirable to shut the machine down.

**New stator coils and other modernization of this synchronous condenser by the Los Angeles Department of Water & Power will increase its capacity from 30,000 kva. to 45,000 kva., or 50%**



# WHEN THE SHOOTING STOPS SELLING BEGINS

**D. J. McGONIGLE**
**Montana Power Co.**

IN the light of the rapid development of electricity in the prewar world with its sharp impact upon human life, any one with a fertile imagination might be tempted to paint a fantastic picture of the future.

A miracle has been wrought by American industry in the last four years.

The electrical industry, of which you are an important part, has played a giant part in this miracle of research, development and conversion to unthought-of production—of unthought implements of war.

One of the first phenomena of the postwar world, I think, is that the American public will re-assert its demand for a still higher standard of living. And, what's important, they will have the money with which to purchase it.

Figures as to the amount and distribution of accumulated savings indicate that farmers have accumulated at least 30 billion dollars; the white-collar class, the salaried people and the so-called "wealthy class," 2 billion dollars; and the wage earner, about 20 billion dollars—a total of 50 billion dollars. Moreover, it is estimated that in the good old days of the "uneasy" payment plan, the American public had mortgaged its future for 4½ years. This indebtedness has been substantially liquidated. The individual American today stands practically debt free, if we may forget our personal interest in the national debt, and with 50 billion dollars to throw into postwar commodity markets.

What is the postwar electric equipment outlook?

Well, there are many things to come which are going to change our living habits. Contrary to some romanticists, these things will not happen over night. There will be a gradual and orderly development, with everyone starting pretty much from where he left off. But even that won't be so bad, will it? The 1941 automobile and refrigerator were pretty good pieces of equipment—weren't they?

People today are paying more money for used equipment of more ancient vintage. Imagine how we would grab at new 1941 models if they were available today. So I think we can first look for the 1941 models—dressed up a bit of course—when civilian production is resumed. But let's not forget that reconversion from war to peace is going to take some time. It took an average of six to eight months for industry to change production from consumer's durable goods to war products. It is estimated it will take an average of four to six months, depending on the product, to convert from war to peace.

On a recent trip east an official of a large manufacturing plant told me that, if his company were to receive from WPB the green light to resume civilian production, in six months' time they could possibly turn out 5% of their 1941 production—and in 12 months' time they could probably step this figure up to 25 or 30%. So you see it will be some time after victory before appliances are available in prewar profusion.

### Light in the Future

Wartime restrictions on American citizens have been a cloud with a silver lining! Dimouts, blackouts, fuel conservation, and travel restrictions that have kept the family at home during the evening hours, have taught valuable lessons about the comforts and virtues of good residential illumination. Even if this were not enough, we should not forget that from almost every home circle there have gone one or more war workers who have been exposed to 50 foot-candle-levels of illumination in modern factories. Certainly these will not be content with obsolete and inadequate home illumination and will want for themselves and their children somewhat the same "see-ability" that they have found so agreeable and safe in factories.

So into many of today's homes will quickly come a much higher level of good lighting. In all probability it will take the form of retaining all that was good in prewar incandescent and supplementing that with as much fluorescent as can be satisfactorily blended. Fluorescent lighting will invade the postwar home. I think we can look for an average installation of some five fluorescent fixtures.

Circular fluorescent lamps, a new development, may appear in floor and table portables; baby-size fluorescent lamps promise night lights at danger points or at the telephone, or for continuous service in the electric clock. Likewise, baby fluorescent lamps burning continuously can add their bit to the residential house number, and in connection with many luminous ornaments where, heretofore, the tungsten filament lamp on 120-volt service has not been practical in the low wattages.

Obviously, in today's home, built-in or architectural lighting will have a slow evolution, but "light" for other than seeing purposes and devices contributing to the pure joy of living, rank high with those illuminants having to do simply with vision.

Take, for example, the sterilamps. One such lamp should burn continuously in the bathroom; at least one in the kitchen; one in the storage cabinet for china and flat silver; and certainly one or more in any sick-room, child's nursery, etc.

In today's home there could be added a number of infrared heat lamps. One might be a floor portable; another on the bathroom ceiling. Tomorrow's homes can well use a new model of ultraviolet sunlamp, attachable in any lighting socket. Drying lamps can graduate from the factory into the home laundry.

The "comfort home" of tomorrow according to Sam Hibben of Westinghouse might in addition use:

1. One or more "black light" lamps to develop beauty in fluorescent carpets, drapery or wallpaper.
2. A drying cabinet with heat lamps as regular kitchen equipment for dehydration of foods.
3. Luminous wall pictures (transparencies), or projected pictures upon a wall surface.
4. Sterilamps—the portable U-tube form to sterilize bottles, fruit jars, etc., and the

* Presented to the Montana Chapter, International Association of Electrical Inspectors, Great Falls, Apr. 14, 1944.

ring-shaped type for the toothbrush holder.

5. Lamps built into furniture, as, for example, indirect lighting from a small aperture in the table top, or a small luminous window on the high back of a reading chair.

6. Luminous ornaments with glow lamps and miniature fluorescent lamps of a wide variety.

7. Luminescent structural materials in conjunction with special exciter sources—phosphorescent plastics, etc.

8. Mercury and allied discharge lamps for outdoor garden decorations.

9. Steam generator lamps for humidification.

10. Ozone producing lamps, or allied ones, for controlling odors.

Other home lighting tools will surely develop as we turn again to peacetime pursuits. The means are in the laboratory or on the finished blueprint. The job is to spread the gospel of what can be done with light; to transfer our knowledge into desire, and our desire into will power to be ready for tomorrow's opportunities. If the electrical industry can now deliver to the householder in one month nearly the same amount of electricity that he consumed in the entire year of 1920 nationally, is it too optimistic to believe that postwar years will be equally fruitful? I am sure this is not wishful thinking, but cool planning.

### Electric Ranges

The kitchen is the room that holds the largest number of appliances. We can expect greater efficiency, greater mechanization in the kitchen of the home of tomorrow. This is equally true of the laundry.

Quoting Arthur P. Hirose, director of market research and promotion, *McCall's* and *Red Book* magazines:

"The all-plastic or the all-glass range, like the refrigerator, is a possibility. But contrast the mass production, straightline manufacture of metal ranges and refrigerators in prewar days with the possible difficulty of turning out the same number of plastic or glass units in the same time. It may be years before metal—especially the newer alloys developed in the war—is displaced in these two home appliances.

"Just before the war started, women got all excited about pressure cookers. It's a certainty that the sales of pressure cookers, after the war, will reach extremely large numbers. Range manufacturers are interested in the pressure cooker. Electric range designers are working on multi-speed heating unit controls that will make easier the use of pressure cookers on the surface of the electric range. Other manufacturers are looking into the possibility of building into their postwar ranges one or more pressure cookers, with time and temperature automatically controlled.

"Induction and high-frequency heating is the exciting development for the postwar electric range. The principle is not new—it is ten years old. Prewar range manufacturers and radio apparatus manufacturers are doing accelerated development work on the principle since the war started. However, it may be as much as five or ten years more before this new principle is used in commercially produced home ranges. Obviously, any range that cooks food from the inside out instead of from the outside in, will require a tremendous educational program in getting women to change their cooking habits. Meanwhile the electric range using conventional methods of cooking will be improved with the substitution of even better surface units, better insulation, a better oven and broiler and perhaps the addition of time and temperature controls to more cooking operations."

### Electric Refrigerators

Old-type prewar refrigerators offered only one type of refrigeration. Developments since that time have been largely in the direction of offering a variety of appropriate preservation "zones" for different foods. This trend, interrupted by the war, will be continued, along with the furnishing of greater convenience to the housewife.

Any change in the housewife's food habits would be bound to affect the refrigerator, but it is expected that, after the war, women will return to canned and glassed foods, with no great immediate swing to dehydrated foods, despite the tremendous wartime spurt of the latter. There will, however, be an important increase in the distribution and consumption of frozen foods. This will call for more space in the future home refrigerator for the storage of commercially frozen foods.

Therefore, the postwar period should see the introduction by various refrigerator manufacturers of separate devices for the home freezing and storage of foods. While this market will be greater than it was before the war, it will definitely not be a mass market. Community locker plants will increase. So will the number of stores carrying commercially frozen foods. It is not unlikely that refrigerated delivery trucks will bring to the home at frequent intervals an assortment of commercially frozen fruits, vegetables, meat and fish. This will obviate the necessity of separate devices for home freezing or storing of quantities of foods. An ordinary home refrigerator with a 25 to 50-lb. capacity for frozen foods will take care of the average family's requirements of frozen foods for two or three days. These new type refrigerators will be known as two-temp or dual-temp boxes.

It is to be expected that refinements will be made in the home refrigerator to make it easier to load and unload the food. The round refrigerator with rotating shelves is a much talked about possibility. Automatic defrosting or a refrigerator that needs no defrosting, better door opening and closing devices, perhaps using photo-electric cells, better shelves, better accessories, and an answer to the problem of getting a few ice cubes at a time are all probabilities in the home refrigerator of the future.

There is no startling development in postwar electric water heaters; however, I believe that the public is going to be far more conscious of hot water convenience by virtue of the new allied product development. Certainly, in many areas, electric water heaters are a most acceptable source of supply. Bringing the water heater out of the cellar and into the kitchen is a matter receiving attention by manufacturers and home prefabricators. This will necessitate redesigning to table top levels.

Despite the fact that before the war there were only three companies making household dishwashers, out of scores of companies which once started to make such devices, a number of manufacturers are determined to bring out postwar home dishwashers. The trend to the automatic dishwasher started by one company just before the war will continue. Greater progress will be made in the development of even more satisfactory detergents. More attention will be paid to ease of loading and unloading dishwashers. The problem of washing pots and pans will be solved eventually. Because it is inefficient and unsanitary to store garbage in the home kitchen, development of waste disposal units will continue. The prefabricated homes will almost invariably include dishwashers and disposalls as "musts."

### Automatic Laundry

In the laundry, too, changes are on the horizon. The automatic washing machine has taken such a hold on the imagination of the American home maker that, after the war, all the emphasis will be on the automatic. I know of no company that is planning

to enter exclusively into the manufacture of a traditional, non-automatic washer. The separate first-floor laundry or the combination laundry-kitchen as an improvement over the old cellar laundry is receiving much favorable attention from architects and home planners.

Ideally, every home that has an electric washer should also have an ironer. The postwar period will see more companies introduce ironers that are easier to operate, whether they be rotating or flat plate ironers. Ironers that take up less space in the kitchen are also a probability. There is no reason why the homemaker should be at the mercy of outside weather for drying clothes. More companies will introduce separate clothes dryers or incorporate adequate clothes dryers into their washers after the war.

One of the interesting newer home appliances is the electric blanket. Extensive equipment today building electrically heated protective clothing for high-altitude flying will be converted in peacetime to the manufacture of electric blankets. This item promises a revolution in sleeping habits. Before the war it got its greatest publicity from the word-of-mouth recommendation of pleasantly astonished users. It looks like a red-hot postwar item.

### Air, Hot, Cold and Clean

Certainly, home air-conditioning, embracing ventilation, heating, cooling, and the conditioning of air should make vast strides in the postwar period. For existing homes, room units seem to offer the greatest economical market opportunity. But the new home building boom, particularly in prefabricated homes, may well bring with it mass introduction of complete home air-conditioning. It should not be assumed, however, that this air-conditioning development will be the exclusive province of the electrical industry. There is every reason to expect that gas home air-conditioning will be an important factor.

Electrostatic air cleaning, as applied in ventilating systems, is a new and revolutionary electronic development. Until recently, no practical method had been devised to really clean the air of fine particles. While mechanical filters were, and still are, effective in removing larger dirt particles, they have been practically useless as far as catching the minute particles is concerned.

The only effective method known today of removing very fine particles from an air stream, is by electrostatic dust precipitation, principles of which have been known for many years and applied successfully in boiler stacks, smelters, and cement mills. These are known as Cottrell Precipitators. However, high voltages used in this method (30,000 to 100,000 volts) cause such a high generation of ozone that air thus treated is not safe for breathing, hence not suitable for ventilating systems.

That is the problem that was solved by scientific research in perfecting the electric air cleaner, which operates at voltages that generate so little ozone that its concentration is on the order of that found outdoors on a bright sunny day.

Definite plans are underway to provide electric air cleaning for home use, particularly in homes with forced air heat. Already built are about 100 home central electric air cleaning units, the majority of which are installed as pilot installations in homes around Pittsburgh. Results obtained have been excellent. Dusting the furniture bids fair to become a once-a-month task instead of a daily chore. Hay fever sufferers are loud in their praise of the device.

### Electronics

Great manufacturing companies tell us that the impact of prewar and wartime electronic development upon the home, commerce and industry in the postwar era will be startling. Thanks to prewar development, a soldier in the South Pacific can tonight speak to his mother in Illinois. A farmer in New England can settle down to war news from London. A band can play and three thousand miles away a boy and girl can dance. A bank president, an actor, a Texas ranger can talk through the still night air.

It is almost half a century now since Marconi proved to an astonished world that messages could be transmitted without wires. Today, electronic transmitting tubes flash the music and pageantry of the world through space at the rate of 186,000 miles a second.

Today, too, the electron tube is guiding the destinies of the greatest armies and fleets ever engaged in the history of the world. It is a part of the nerve center of the battleship, directing its course, finding its adversaries, broadcasting running accounts of air battles to its crews, directing gun fire and determining ocean depth.

In the air it is the means of locating and identifying enemy planes, piloting planes automatically, giving communication from plane to plane and the ground. It is even operating the controls of the plane. In the maneuvering tank, in the officer's car, on the back of a foot soldier, it transmits and receives vocal messages from every unit of the fighting forces. Along our borders, and those of our Allies is an electronic screen which counts, follows and identifies enemy planes a hundred miles away through darkness and through fog.

The wall of military censorship is high but it is no longer a secret that the weapon that kept the Luftwaffe from exterminating London was an electronic locator—radar—a device that gives alarm of approaching planes long before they can be seen with periscopes. Scanning the horizon constantly, the locator warns of the enemy's approach. In the nose of the night fighter, the locator informs pilot and gunner when the enemy is within range. Neither is it a military secret that gunfire can be controlled by electronics, and that electronics is having a big share in training our new armies. The incredible accuracy of U. S. naval guns at Casablanca, which at 26 miles smashed the hull of the French battleship, *Jean Bart*, in two salvos, was a triumph for the electron tube.

Even at the very hour that war began, the electron tube was the first to serve the nation for on Dec. 7, 1941, it caught the mutter of the Japanese aircraft when they were 132 miles away from Pearl Harbor.

When war ends, the new war-born developments will "go to peace."

Miraculous as radio is today, tomorrow's radio will be vastly improved. A new radio system, Frequency Modulation—known as FM—already has revolutionized the world of transmitted sound.

FM reception abolishes the imperfections of present-day radio. One of these is static, caused by nature's lighting and sunspots, by man's electric razors or dial telephones. FM reception is clear and unmarred, because FM eliminates interference, the hum and cross-talk on the same channel. Even when two or more stations are near, FM selects only the one you wish.

The human ear is sensitive to a range of sound from 16 to 16,000 vibrations or cycles per second. Conventional radio does not reproduce sounds higher than 5,000 cycles. But FM radio opens up the full highway —the range of piano, violin, voice— with all the delicate overtones that give music color and life.

Yes, radio—perhaps more than any other appliance or device used in the

home—will reflect great postwar changes. These changes will necessitate new equipment both in broadcasting station and in the home. But in radio circles it is anticipated that these changes will come with a rush in the early postwar years.

### Television

And what about television?

Voices have spanned the miles for years, and signals have journeyed across the Atlantic since our Civil War. Man, however, still dreamed of bridging distance by pictures.

Television to project pictures on screens 18 by 24 inches, in full color, is already possible. Programs are now picked up at Schenectady from Manhattan, 135 miles away, forecasting national network programs by relay stations and space radio. It is also possible by wired radio, but requires special cable. This co-axial cable is already laid between Chicago and New York. Is this the beginning of a national network? Maybe. Informed circles seem to feel that television will make relatively rapid progress in the eastern, well-populated areas. Extension to the more sparsely settled areas will be delayed. If you were to ask me for an expression as to when television would be available to Montanans—with a wild guess I would hazard from five to 10 years after the end of the war.

Yes, in the electronic tomorrow both sound and sight will travel the air waves. We can relax at home in our armchairs and watch a ball game, a stage show in full and glorious color, or watch a red robin as we listen to its song. Television will make the home of tomorrow a window on the world.

Some postwar day, then, we can expect a combination entertainment instrument in the home. It will contain a frequency modulation radio-receiver, a phonograph that will automatically present recorded music and entertainment either from discs or strips of film or magnetized wire, a television receiver and perhaps some facsimile device for receiving and recording in permanent form, bulletins, drawings, photos, etc.

Where is the man who can guess the full effect of postwar electronics upon our way of life?

Will it in time revolutionize present methods of education? Fantastic you say? Thirty thousand air raid wardens, gathered in 81 fire houses and police stations in New York City, were trained in this manner—the first instance of mass education by television and radio.

How will it affect agriculture? Early last year, after a long period of experiment, an enterprising seedsman in Philadelphia offered American gardeners new calendulas. One flower is golden, double petaled, the other orange and semi-double. Both were created by the genetic effect of X-rays on seeds. Is it possible that the action which produces different strains of flowers may also produce grains and vegetables and cotton and fruits of higher yield and finer quality than before? A total of 2,600,000 of the nation's farms is already electrified and ready; 3,500,000 still await electrification. Time doesn't permit me to even highlight present-day industrial use of the science of electronics other than to say that already 15% of the industrial kilowatt-hours used in this country are flowing through electronic controls.

Though the electronic tomorrow is unknown, we do know that electronics will invade every home and every industry. Dr. W. R. Whitney, first director of the General Electric research laboratory, sums it up in these words, "I would not dare say what I think electricity may do in the future. We are always supposing we have exhausted our knowledge in many directions. Discoveries are not terminals; they are fresh starting points from which we climb to new knowledge."

### But Away with "Cobwebs"

Woven into the tapestry of today's and tomorrow's homes, stores and buildings are the much too small threads of copper upon which postwar electrification depends. The present copper cobwebs (that in size of conductors, have not advanced one whit in the last three decades) cannot even properly take care of today's lighting and appliance demands. The percentage of No. 14 wire in residential usage that has been sold in recent years was just as great as its percentage to the total sold before there were any refrigerators, ironers, cleaners, radio or tungsten filament lamps.

Wiring in better than 95% of America's homes is inadequate to carry present lighting and appliance loads efficiently.

The penalty that is placed upon the sale of some pieces of major equipment, as the range, water heater, and the dryer, due to inadequate wiring for equipment of this nature, has greatly retarded use of these important units. It has deprived thousands of home owners, who can use equipment of this nature, of the convenience it can bring them. A study of service problems indicates clearly that far too high a percentage of service calls, including those of changing fuses, is caused not by defects or imperfect performances on the part of the appliances, but the poor wiring . . . overloaded circuits . . . insufficient outlets . . . and last, but not least, improper, antique and hazardous circuit protection.

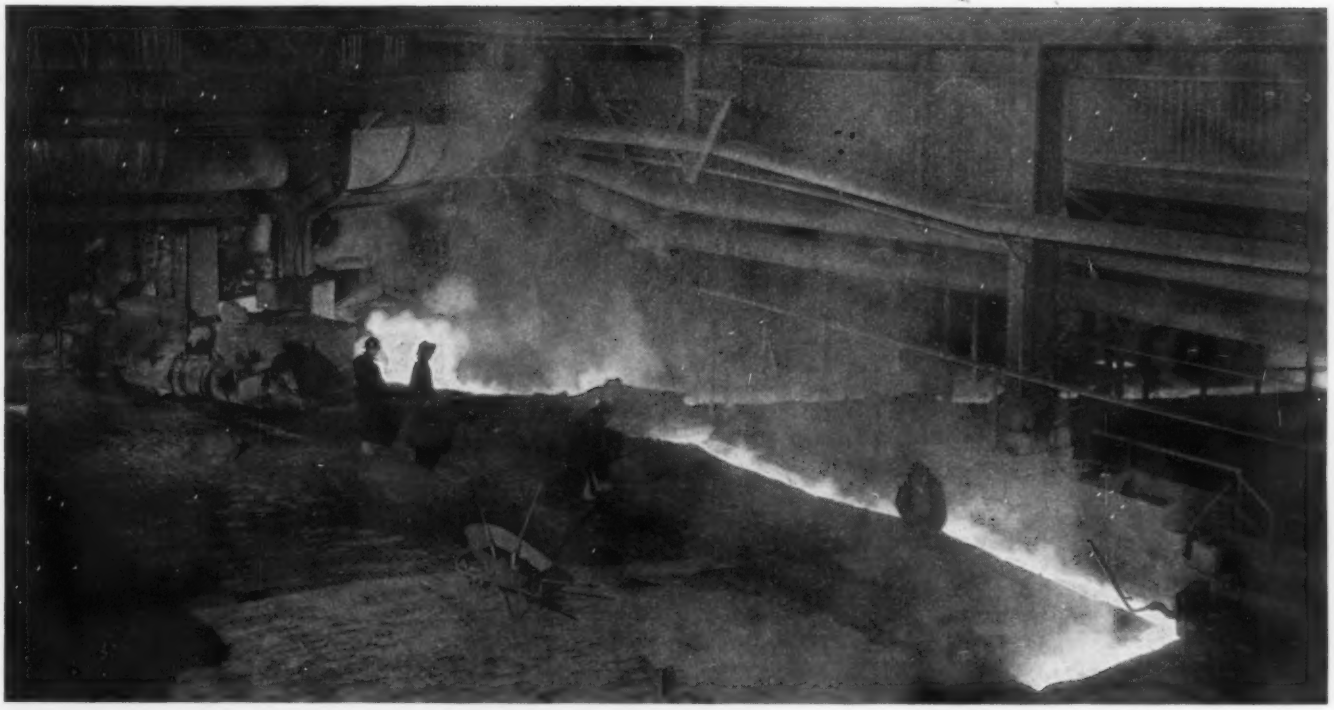
Any program that increases the appliance load in the average home must be accompanied by a well-organized wiring program. It is hardly fair to sell a plug-in appliance and leave it in the laps of the gods or the wireman and the new owner to find a means of connecting this new unit to the electric system in the home. Far too often the housewife accomplishes this with a three-way plug gadget purchased from the five-and-dime store, adding to the burden of an already overloaded circuit, and to your problems and ours.

Every appliance, be it of the small table variety or a major unit, has a wiring characteristic and should be sold with full knowledge to the purchaser that, only when these characteristics are satisfied, will the appliance render its intended efficiency.

The Adequate Wiring Bureau has struggled long with this problem. Some progress has been made—a great deal remains to be accomplished. It is an industry problem, the solution of which will require an *all-out coordinated effort* on the part of every utility—every electrical manufacturer, every architect, every engineer, every inspector, and every contractor as well as bankers, insurance companies and federal financial institutions—if the postwar goal of full appliance use is to be accomplished.

The future challenges us to do two things. First, we must see to it that the thousands of new homes to be built annually in the immediate postwar years are wired, not just in accordance with the minimum standards of the safety codes but with a capacity for at least double the peak demands of today. Secondly, we must find a way to rewire, or adequately and safely "up-wire," the majority of the old homes if their occupants are to share in the rich benefits of postwar electrical living.

The electrical inspectors are an important group in the electrical industry. You have done a great work. No one realizes more than we do the battle you have waged for higher standards of electrical wiring. No one realizes more than we the important part you will play in influencing wiring trends of the future. To you in your problems and their solution we pledge our hearty cooperation.



Extreme brightness of molten iron from tapped blast furnace compared to surroundings illustrates the lighting problem

# LIGHTING DESIGN FOR KAISER STEEL

**ROBERT L. DEARBORN**
**Kaiser Co. Inc.**

LIGHTING requirements of an iron and steel mill are at once different from, and the same as, those of other industrial plants. A steel mill is different because of the process itself. The material handling is an extensive and specialized job; the blast furnace is unique, having no counterpart in any other industry; the open hearth, the rolling mills and the coke plant are peculiar to this industry.

However, a steel plant is the same as all other plants in that the same natural laws and engineering principles are effective. Specifically, the illuminating engineer sees in a steel mill, not a strange, puffing, clattering behemoth, but a fairly large number of individual and definable problems. The interesting part of his job is the extreme nature of the problems, which range from excessive brightness contrasts to the most inherently dark environment imaginable. Then there are the physical limitations and restrictions to harass him. It would seem that some of the steel mill lighting and seeing problems are doomed to remain unsolved, unless steel making methods are changed.

The lighting of the Kaiser plant at Fontana, Calif., was designed step by step, each problem being considered on its own merits, using exactly the same approach as would be used on any other job. Certain forms of procedure were drawn and carefully followed. As might be expected, mistakes were made and corrected many times during the design and construction period. Some problems would be solved differently if we were to do the job again. However, the general approach has proved to be sound and effective.

**Big steel is new to the West. Not often is a large steel plant built from scratch, in such short time, nor by men a majority of whom are new to steel. The Kaiser approach gets results because it begins with intense study of what others have done and proceeds by applying the sound engineering principles discussed in this article. Pictures tell results.**

It may be remembered that an outline of design procedure was published in ELECTRICAL WEST, Sept. 1943, p. 50. Some of the fundamentals therein, amplified for this specific job, may be restated thus:

Any properly designed lighting system should be justifiable upon a realistic, practical basis. To do this it is necessary to be guided by at least one of the following methods of appraisal:

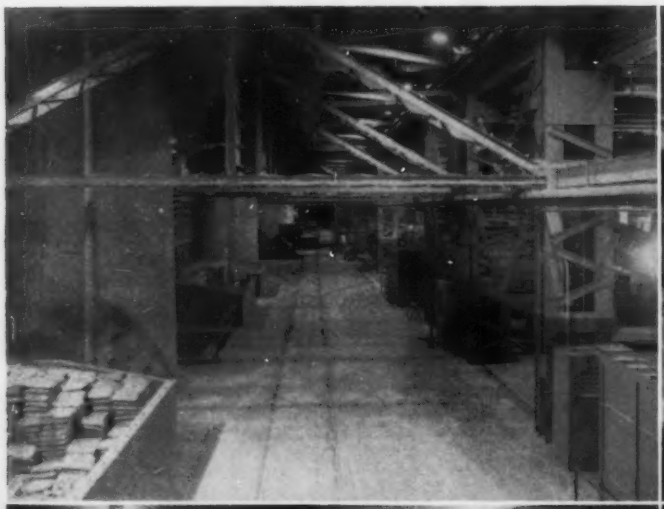
1. Officially approved standards based upon
   a. Satisfactory general practice which has withstood the test of time,
   b. The judgments of qualified field observers, and
   c. Scientifically conducted field measurements and tests of the visual task and of methods to satisfy the actual requirements.
2. Application of the fundamental principles of illumination design in connection with a study of the visibility requirements.
3. The considered observations of persons experienced in the operation or process in question.
4. Modifications of the above due to unavoidable limitations and legal restrictions or requirements.

# General Illumination

Open hearth teeming floor; 5 f-c general illumination at floor

Below, top row, left, open hearth back of charging floor; mold preparation area. Bottom row, interiors of machine shop, left; electric shop, right. Descriptions on facing page.

Below: Open hearth charging floor showing hot metal mixer in the foreground. General illumination 10 to 15 f-c from high-bay units



From the facing page, bottom of page: Open hearth, back of charging floor, illuminated from sides at catwalk level by floodlights mounted on hinged brackets for easy maintenance. In mold preparation area general illumination is uniform at 10 to 12 f-c, a minimum for operations in this area. Both machine and electric shops are lighted by combination mercury-vapor and incandescent units. Machine shop general illumination is 20 f-c with local lighting on machine tools extra. Electric shop general level in center bay is 20 f-c. Closer spacing in side shop bay provides 30 to 40 f-c level

1

It was found that crane lighting is necessary no matter how high the level of general illumination. Reasons: (a) Crane casts a shadow, (b) Crane operator has a difficult seeing job, (c) Crane illumination precedes the crane as a warning to men on the floor. Specifications for Kaiser plant crane lighting are: (a) Crane lights must be rugged, made for rough service; (b) Installation must permit safe, easy access for cleaning and relamping (p. 94); (c) Illumination directly under the crane must be about twice general illumination; (d) Units must be so placed to control the light for the benefit of the crane operator—i.e., from him and toward the work

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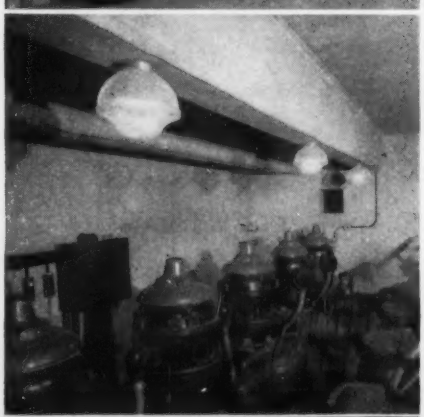

On this page in numbered sequence: (1) Sinter substation, with 6,900-volt switchgear, left, precipitron air cleaner at rear and 460-volt circuit breaker panel at right and general lighting. (2) Vaportight installation in auxiliary storage battery room in plate mill motor room basement. (3) Example of a vaportight installation in a pump room. (4) Mounting detail of lower chord installation in structural and merchant mills. Unit (1,000-1,500 watt) with bracket was assembled and wired before welding into place. (5) Dust tight, concentrating type, 1,000-watt reflector as mounted to lower chord in plate mill and open hearth buildings

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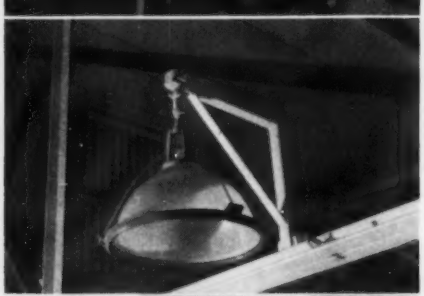

For outdoor lighting: (6) Mounting detail of 500-watt floods on steel bracket on roof top for area lighting. (7) Simple, inexpensive, yet adequate area lighting pole. Mounting detail shows use of cross arm brackets for support. (8) Street and area lighting series regulator control cabinet for 6.6-amp., 15-kw. series circuit. (9) Asymmetric refractor mounting detail. Such units are used for lighting exterior stairways and catwalks. This one is mounted on an angle-iron bracket that is welded to the steel panel siding

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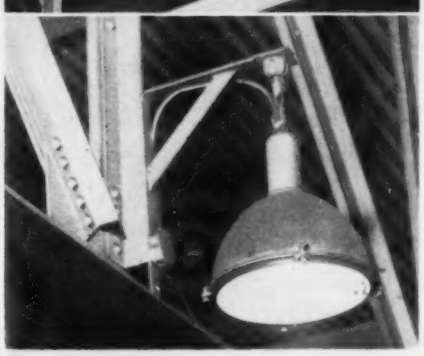

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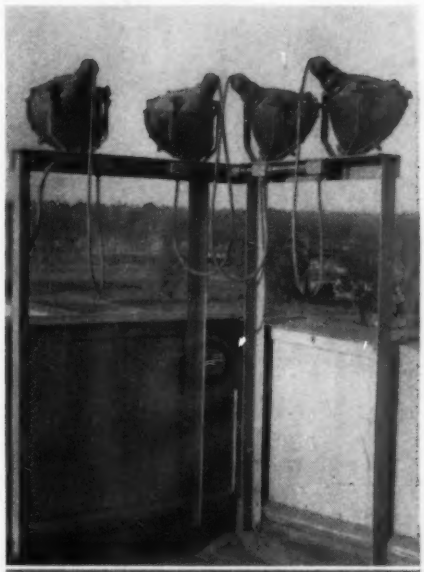

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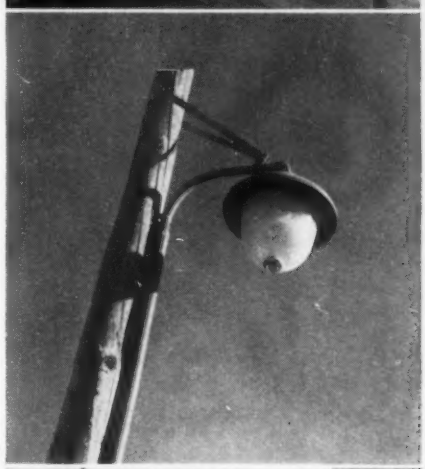

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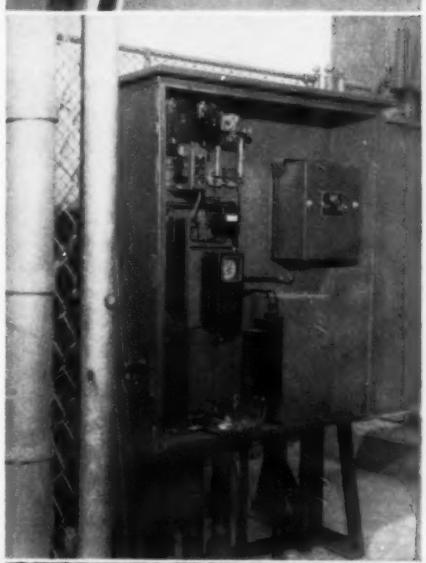

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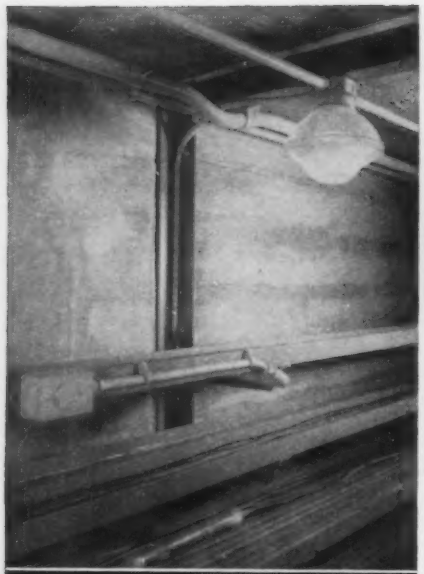
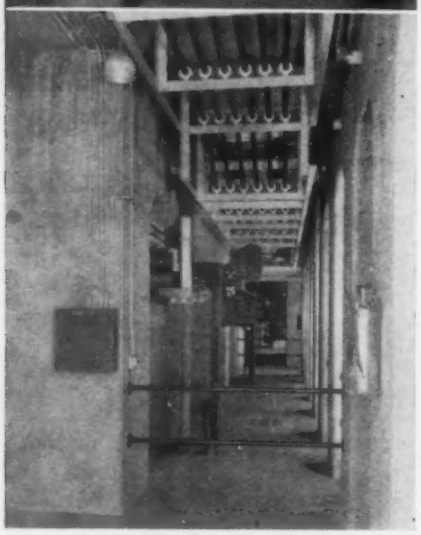
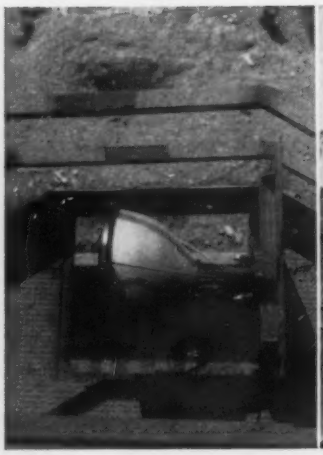
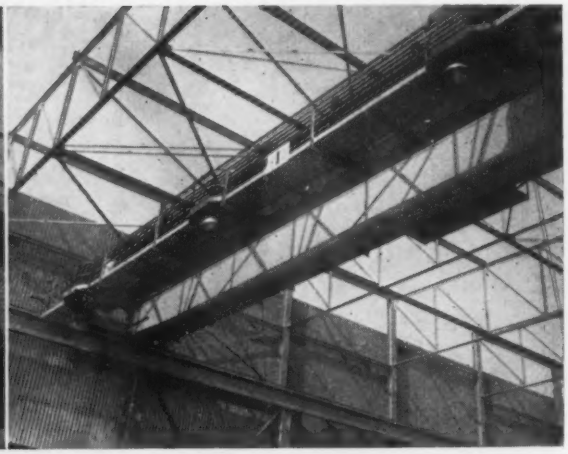




Above, top, asymmetric refractor as installed generally in power tunnel over the cable racks. Center: For the tunnel under the soaking pits a watertight installation was required. Watertight shields and hoods mounted on an offset fitting parallel to the ceiling (see inset) also shield lamp and reduce glare as well as give more headroom. Bottom: Motor room basement cable racks. Lighting required to provide visibility of racks and equipment





**Craneway lighting equipment built into the catwalk of the crane. Lighting units are mounted on a trap door which is lifted for access and maintenance of unit**

The designer *must* acquire an intimate knowledge of the processes and operations in the plant. To this knowledge is applied a line of reasoning based upon the fundamentals involved in the act of seeing.

As a general guide the most important of these fundamentals are outlined below:

A. Visibility requirements as determined by the character of the visual task and the operation involved are
   1. The size of the detail to be seen,
   2. The contrasts in reflection factors,
   3. Average reflection factor,
   4. The time allowed for seeing, and
   5. Color differences

B. Ability to see is influenced by the external conditions of
   1. Average brightness of surroundings,
   3. Size, brightness and location of bright areas within the field of view,
   4. Brightness contrasts within the central field of view,
   5. Brightness within the surrounding field, and
   6. Pre-exposure of the eye to brighter or darker surroundings.

C. Operating procedure often modifies or limits the possible methods of providing illumination. Movements and positions of the operators and workmen introduce "shadow" and "glare" problems. Direct or reflected glare can and often does largely cancel the value of an otherwise adequate illumination.

D. Physical limitations such as machinery and structural members influence both the quality of lighting and the type of lighting equipment that can be used.

E. Operating conditions such as accessibility, dust and water and frequency of use, affect the choice of lighting equipment.

F. Economy of installation and operation of lighting equipment must be balanced against both the measureable and the intangible benefits of the illumination.

G. Visibility and the general success of an illumination system are usually as much affected by the painting of the surroundings as they are by the level of illumination.

H. The levels of illumination and qualities of lighting are determined by the above factors. The level of illu-

**Table I**

**Illumination Levels at the Fontana Plant**

| Location or Type of Work | Illumination (f-c) Average | Maximum | Minimum |
|---|---|---|---|
| **Administration Bldg.** | | | |
| Offices | 35 | 45 | 25 |
| Corridors | 3 | 4 | 2 |
| **Mill Providers Office** | | | |
| 2nd Floor, large room | 25 | 28 | 22 |
| 1st Floor, small room | 17 | 15 | 20 |
| **Main Guard Station** | | | |
| (Gate No. 1)—At side of auto being passed by guard | 30 | 35 | 20 |
| **Guard Station** | | | |
| (Gate No. 3)—At face of person in identification line | 25 | 30 | 20 |
| Under roof overhang | 15 | 20 | 10 |
| Ground level, 20 ft. from bldg. | 2 | | |
| **Foundry** | | | |
| Pouring area | 3 | 4 | |
| Under crane | 7 | | |
| Material preparation | 12 | 10 | 5 |
| **Soaking Bldg.** | | | |
| Runway below Control floor | 7 | 10 | 5 |
| Control floor | 7 | 10 | 5 |
| Main floor, top of pits | 3 | 3 | 3 |
| **110 in. Plate Mill Bldg.** | | | |
| Rolling, levelling, shearing | 10 | 12 | 8 |
| Runout, shipping | 6 | 7 | 5 |
| Motor room | 8 | 10 | 5 |
| Motor room basement | 10 | 15 | 5 |
| Control rooms | 8 | 15 | 5 |
| Under cranes | 15 | | |
| **Open Hearth Bldg.** | | | |
| Mold yard | 10 | 11 | 8 |
| Teeming boy | 5 | 5 | 5 |
| Charging floor | 10 | 12 | 8 |
| Storage bins; Scrap storage | 8 | 10 | 5 |
| Under cranes | 10 | | |
| **Power House** | 10 | | |
| **Blast Furnace** | | | |
| Cast house | 5 | | |

**Cooling tower lighting for inspection and safety. Two types used: at left, "island" type; at center, asymmetric vaportight refractors. Right, main gatehouse, where 30 f-c from 16-ft. refractor F lamp units lights auto occupants**

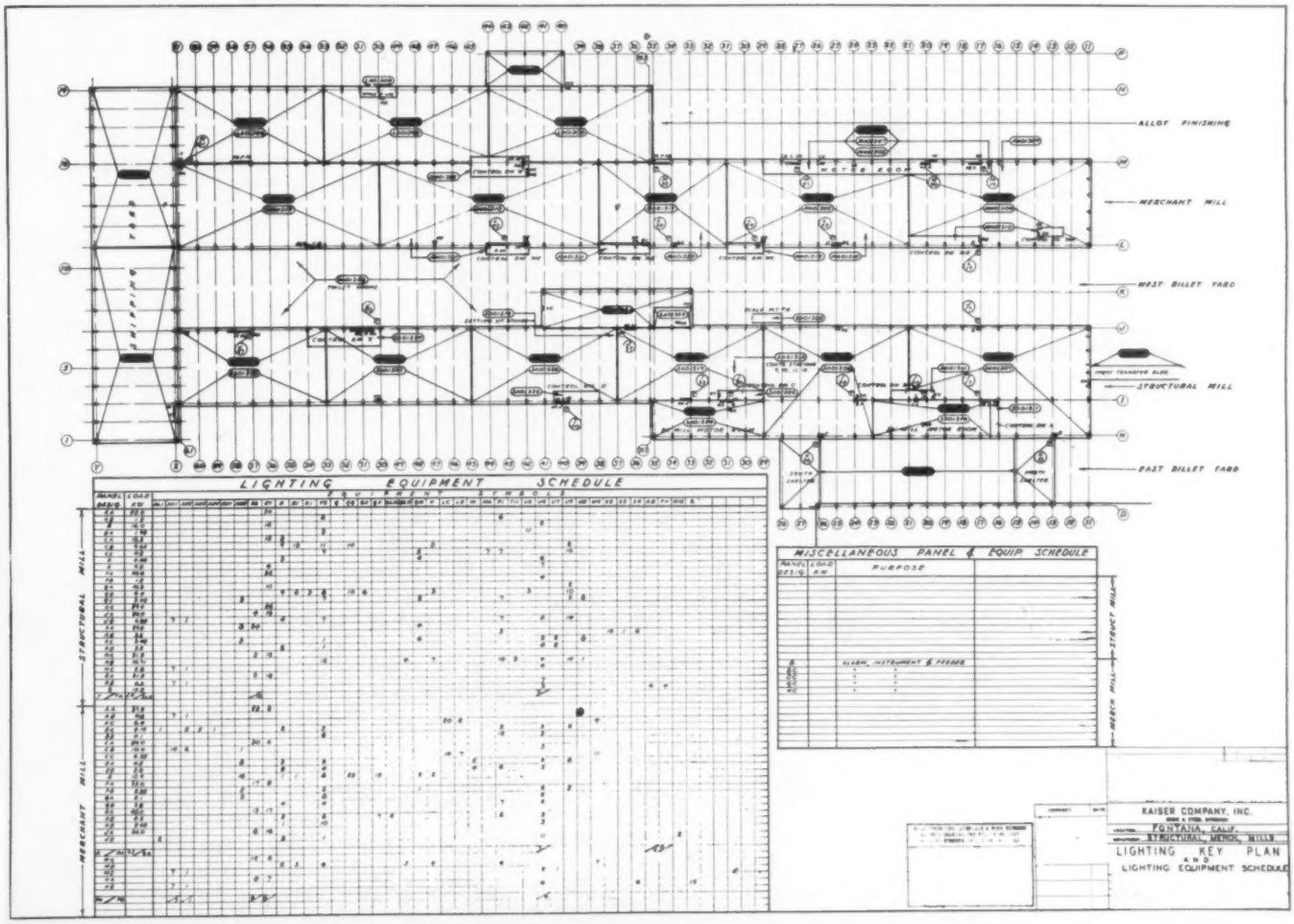
mination is not critical within a few per cent. For example, there is no substantial difference between 4 and 6 foot-candles or between 10 and 13 foot-candles, or between 20 and 30 foot-candles in most cases. The other modifying factors are more important as influencing lighting design than is the absolute value of illumination.

The generally accepted, but by no means accurate or conclusive, method of appraising a lighting system is by measurement of the illumination level, in foot-candles or incident lumens per square foot. It will be seen from the above outline of fundamentals that the illumination level is only one factor in determining the effectiveness of a system. The final over-all appraisal of a general lighting system must rest upon measurement not of the incident light but of the reflected light, for the latter and not the former is what reaches the eyes causing objects to be visible. Reflected light is measured in terms of brightness the unit for which is the foot-lambert, or reflected lumens per square foot. Numerically the foot-lamberts are approximately equal to the product of the incident foot-candles and the reflection factor of the surface (for the usual types of building and floor surfaces).

Judgment or appraisal of a lighting system on the basis of brightness will consider its two general features—(1) the average brightness of the surroundings, and (2) the ratios of the maximum and minimum brightnesses to the average brightness.

Feature No. 2, above, partly determines to what extent glare is present.

**Key plan indicates drawings for each portion of these two mills and areas**



Sinter building conveyor bay lighted by side brackets mounted on columns on each side. Conveyor is not yet in

Blast furnace stock house lighting provided by angle reflectors mounted on girts between source-concealing columns

The glare may be more or less glaring depending upon how prominent or noticeable it is (or how near the glare source is to the normal line of sight).

Applying the above and with the aid of many minds and hands more than 300 drawings were prepared, 8,000 lamps were installed in as many luminaires of all types, totaling a connected lighting load of nearly 2,500 kw.

Further studies are being made under operating conditions in order to improve the results or to obtain maximum effectiveness at minimum cost. Many measurements have been made after the 40 to 60% depreciation, common to steel mills, has reduced the illumination to an operating average. A few of the illumination measurements are listed as a matter of interest in Table I.

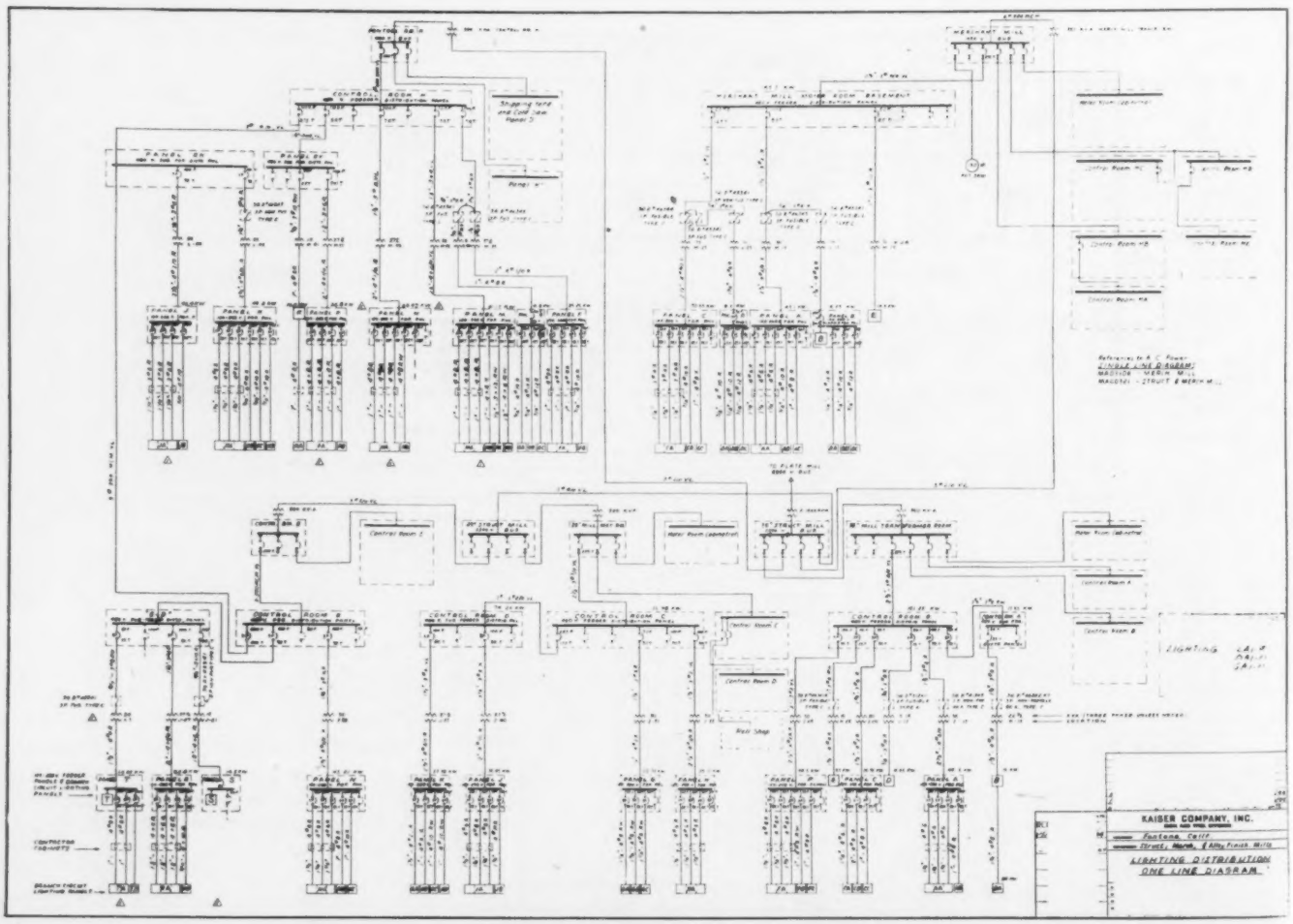
### The Uses of Lighting

In connection with the plant lighting studies to determine the needs and uses for lamps and equipment, the following classification was used.

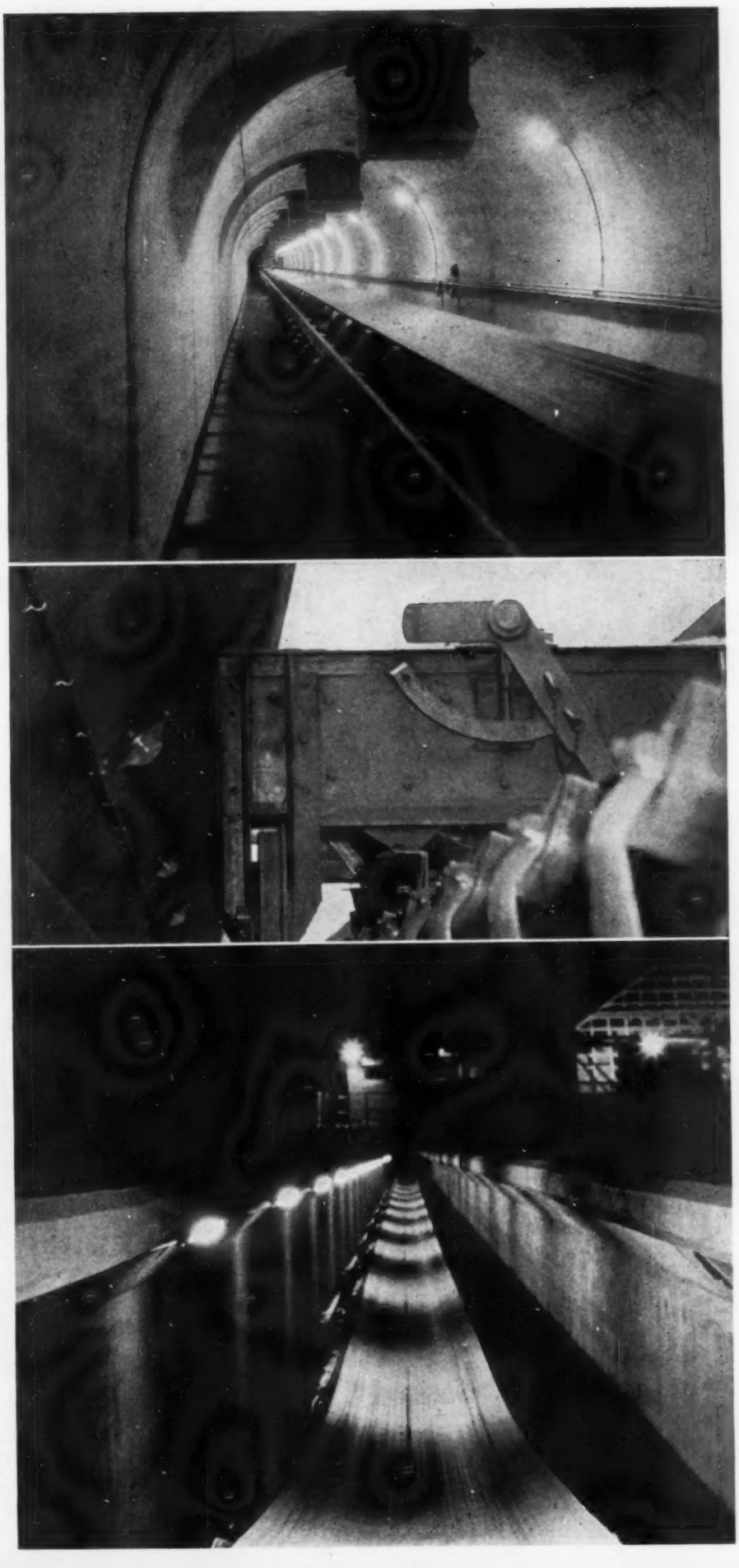
Illumination is required in the plant primarily to serve one of two general functions—(A) Safety, and (B) Operations.

A. Where safety is the most important reason for providing lighting facilities it is essential that the light be available 100% of the time. Such a need is classified in three groups:

a. In some cases no local or wall switches are provided and the lamps are expected to be on all the time. This is because a hazard would exist if a person should forget to turn on the light or be required to grope in darkness for a switch after entering the area.



**Reclaim tunnel beneath limestone stock pile. Limited clearance required development of special asymmetric refractor assemblies. Upper picture, mounted on 25-ft. centers, 1 to 8 f-c with 100-watt lamps. Center shows unit in daylight. Bottom, effect at night in reclaim trench, 26 ft. spacing, 60-watt lamps**



b. In other cases where both the lighting control switch and the need for light can be and are obvious to a person before he enters the hazardous area it is not necessary to have the light turned on all the time. Switches are prominently located in these cases for use by the personnel.
c. Where regular lighting requirements exist such as for street lighting, automatic time switches are provided for operation of the lighting in those areas.

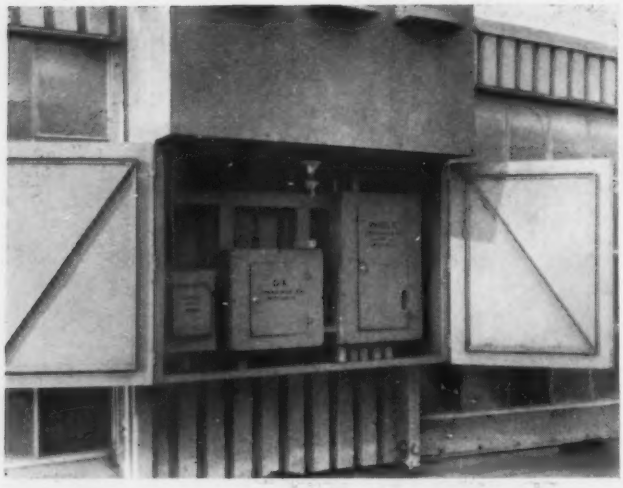
B. Illumination for operations is classified in two groups:

a. Utility areas in which illumination is needed only part of the time, or usually in just part of the area at any one time, are provided with suitable switching control to be operated by the personnel as required.
b. Production areas usually have quite well defined minimum requirements, but the operators do not always recognize that very substantial savings can be realized by selective control of the general lighting system.

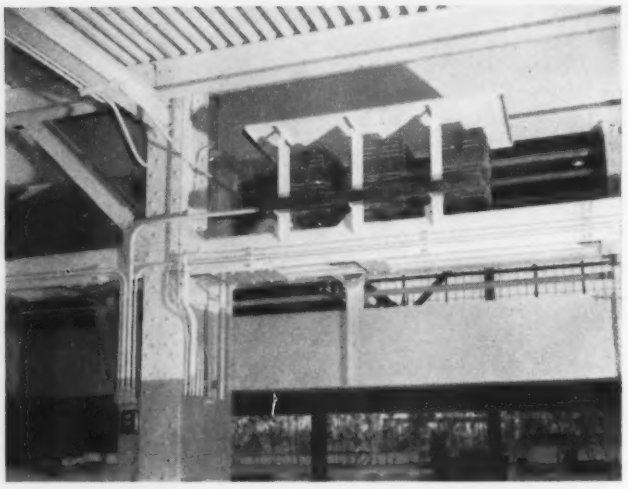
In the open hearth, plate mill, structural mill and merchant mill buildings the wiring system is arranged to permit step-by-step operation of the lighting as a daylight supplement or for limited operational requirements. In all cases push-button control of the general lighting system is brought to centrally located points for convenience. Probably as soon as sufficient data have been collected, time switch and photoelectric control will be employed to operate the general lighting in all the large buildings. This can be done by making a few simple connections to facilities already prepared for the purpose.

With such a variety and volume of lighting as such a plant provides, a detailed description of the solution of the various lighting problems presented would require more space than is available. But since pictures are more eloquent than words the accompanying photographs and their accompanying descriptive captions show both the general lighting and many of the special lighting applications made in this plant. A separate account of the lighting of the administration building and hospital will be presented later.

In a plant of this size the lighting problems are dynamic, changing in importance and scope, just as are the processes and the operating personnel. An alert engineering staff will constantly strive for increased production and lower unit costs, collecting more and more data and perfecting the facilities for greater effectiveness.



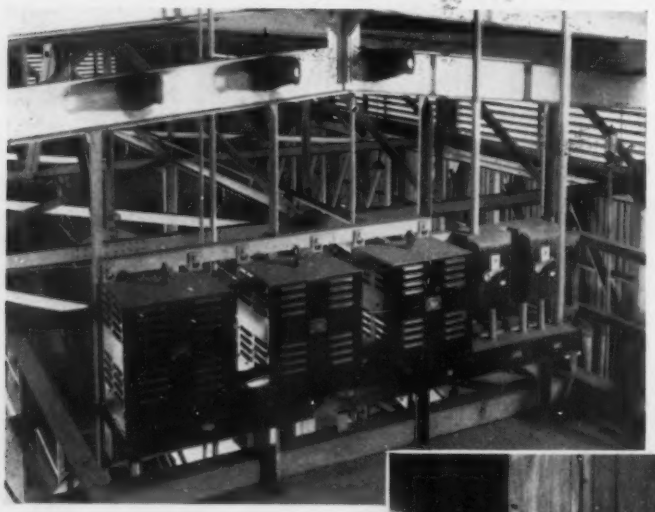
Weather protected installation on roof of the plate mill



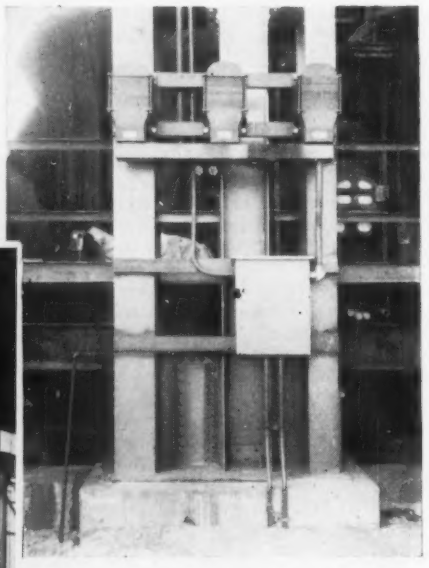
3-10 kva, 460/120-208 v, transformers in soaking building

# Lighting Transformers

## How they are located at Kaiser Steel

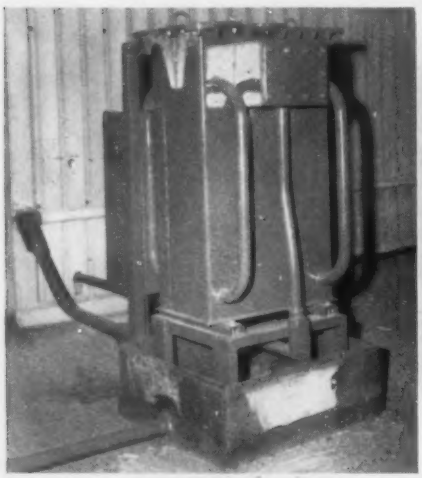


Dry type transformers mounted on balcony in sinter building, connected by wiring trough along the bottom

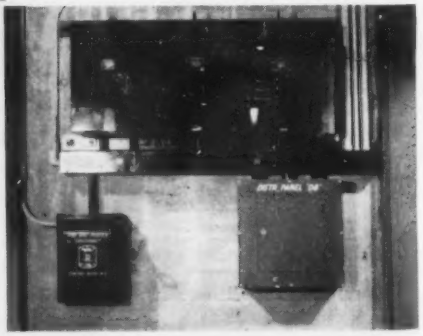


Above: Group of air-cooled lighting transformers mounted on column in the structural mill. Control panel is in the box below, at working level. Below: a group of small transformers on a wall

On concrete columns in the foundry transformers and control switches and circuit breakers for lighting are located. Transformers generally are mounted up out of the way of any possible damage or contact, with switching at convenient points



150-kva., 460/120-208 OISC transformer, one of six on roof of open hearth building, feeding down to catwalk level. Pan and drain trap oil leak



# Electronics at Work In Industry—VII

**In this seventh and concluding article in Mr. Morris' series on electronics, the mass spectrometer, vibration, fatigue and balancing equipment electronic applications are discussed**

*E. W. Morris*
Westinghouse Electric & Mfg Co.
Los Angeles

INDUSTRY today finds it impossible to produce rapidly and accurately without the aid of electronics. Aside from the many power devices placed in service after 1930, including the Ignitron rectifier, resistance welding and motor control, there have been many tools developed recently which increase both the quality of products and the speed at which they can be manufactured. No longer is guesswork necessary in precise and critical processes, for new electronic tools are available which eliminate any element of chance in the manufacture of a product.

In concluding this series on electronics, some of these proven tools of industry will be described. These are but a few of the many successful instruments and other devices which are in constant use creating better and more uniform products.

### The Mass Spectrometer

The petroleum and synthetic rubber industries long have needed a device for checking continuous processes before an error in the mix might cause spoilage to thousands of gallons or many tons of material. After several years of experimental work, Dr. J. A. Hipple, research engineer for the Westinghouse Electric & Mfg. Co., succeeded in developing the mass spectrometer, an electronic device which now makes possible accurate analysis of gaseous compounds in a matter of hours instead of days. With this new tool, both quantitative and qualitative components of a gas can be measured with accuracy. As an example of its sensitivity, the mass spectrometer can detect readily the presence of one part of oxygen in 10,000 parts of nitrogen.

Operation of the mass spectrometer tube is shown schematically in Fig. 1. A small quantity of the gas to be analyzed is admitted at the upper end of the evacuated tube, where it is ionized by impact of electrons from an electron stream flowing between cathode 1 and anode 2. Ionization of the gas being studied is accomplished just below electrode 3, and a beam of positive ions of the gas is accelerated by a negative potential on electrode 4.

As this stream of ions moves through the analyzer tube, it is bent into an arc-shaped path by a strong magnetic field applied externally. Unlike the electron, masses of positive ions are different for the various elements or compounds, consequently they will have different curvatures of path in the mass spectrometer tube.

By close control of the ion acceleration by electrode 4, and the magnetic field strength, the stream of ions can be made to impinge upon the collector plate 5 at the lower end of the tube. From there the electrical charges of ions of different masses can be collected separately, amplified, and measured either by indicating or recording galvanometers. It should be recalled from the first article in this series that the positive ions of the different elements vary from approximately 1,800 to 400,000 times the mass of an individual electron. The positive ions of complicated gases also may be expected to have different masses thousands of times greater than an electron.

It is possible to vary the strength of the magnetic field so that ion streams of different masses can be made to impinge successively on the collector plate, and measured quantitatively. Qualitative measurement comes in knowing the exact strength of magnetic field which causes a given ion stream to be deflected to the collector plate. The mass spectrometer is expected to have many industrial uses aside from the petroleum and synthetic rubber industries, such as checking gases in controlled-atmosphere furnaces, or gases in other processes to detect the presence of an impurity.

### Vibration Fatigue Equipment

To conserve materials and reduce weights of mechanical parts, fatigue tests are desirable, rather than to con-

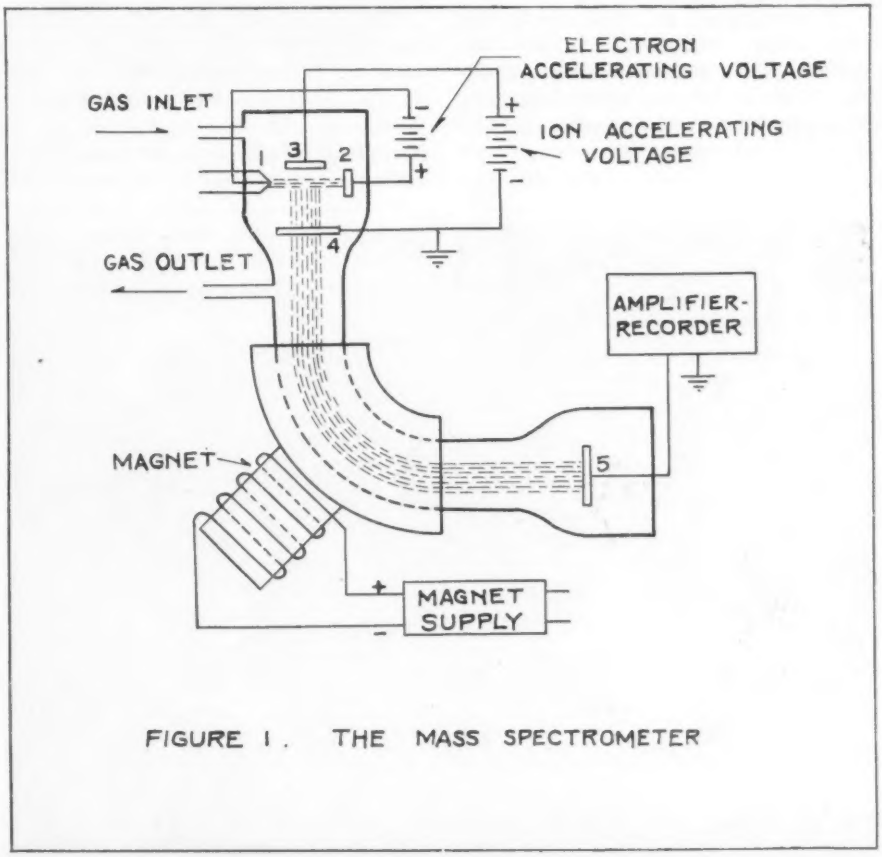
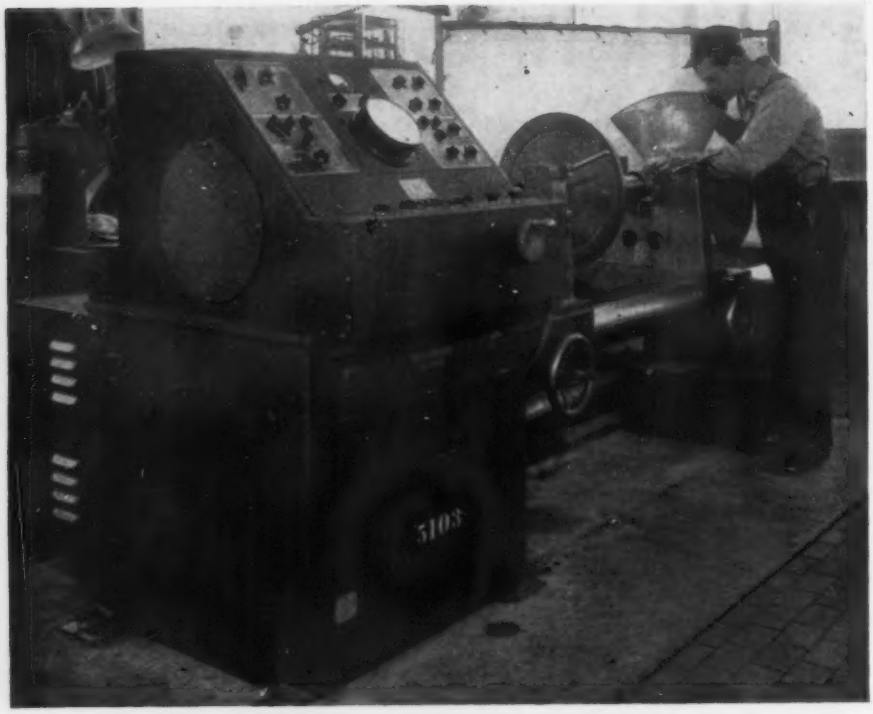



FIGURE 1. THE MASS SPECTROMETER

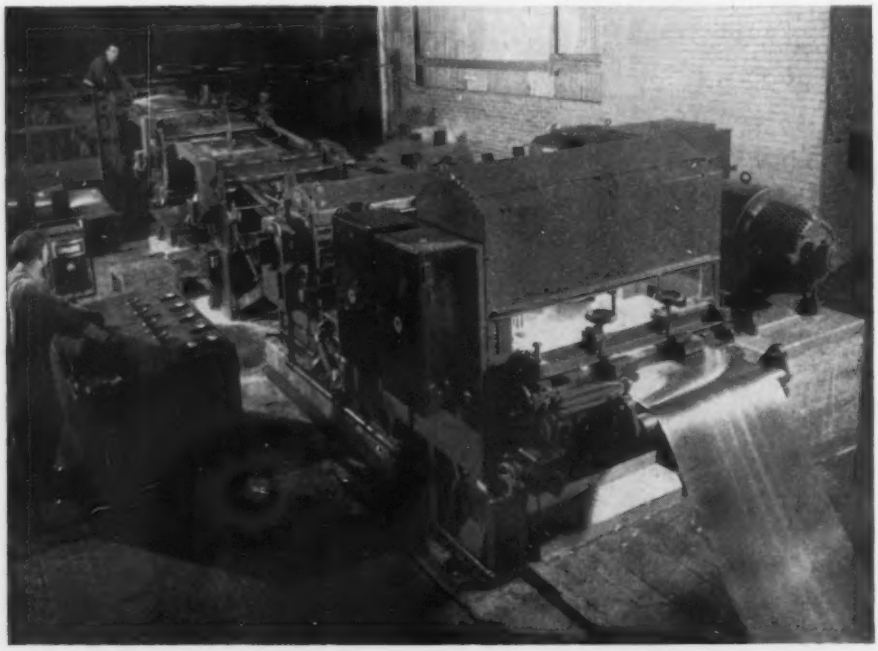


Checking a turbo-blower for balance on a Westinghouse-Gisholt dynetric, electranic balancing machine in U. S. Naval Drydocks at Terminal Is., Long Beach, Calif. This machine detects unbalances up to 25 millionths of an inch in rotating equipment weighing up to 1,000 lb.

tinue making the parts unnecessarily strong and heavy. Stresses severe enough to cause failure are often caused by vibrations of high frequency. In devising tests for such high-frequency vibrations, it soon became evident that these could not be produced satisfactorily by mechanical methods. As a result, an electronic device was developed for producing vibrations at high frequency.

It consists of an electronic generator which energizes a giant loud speaker, known as the vibration motor, 16 in. in diameter and 15 in. high. The part to be tested mechanically is independently supported and connected to the spindle of the vibration motor, where a maximum amplitude of plus or minus 3/8 in. is obtained at the lower frequencies. The electronic generator is a beat frequency oscillator having a range of 10 to 10,000 cycles. It may be used with a 40-watt amplifier, which may be augmented with a 500-watt amplifier to energize the drive coil in the vibration motor, as indicated in one of the illustrations accompanying this article.

The resonant frequency of the sample being tested can be determined quickly by adjustment of the electronic oscillator. This makes possible accelerated life tests and study of the sample for fatigue at its natural frequency. The control panel includes an automatic shutdown relay which is sensitive to changes in the amplitude of vibration in the mechanical structure being tested. Frequently a change in amplitude of vibration occurs prior to ultimate failure, and operation of the automatic shutdown relay allows examination of the test specimen before it is damaged or destroyed by complete failure.



Another successful electronic application is this phototube pinhole detector that will detect holes 1/64 in. and smaller in tin sheets running at speeds up to 1,000 feet per minute

### Dynamic Balancing

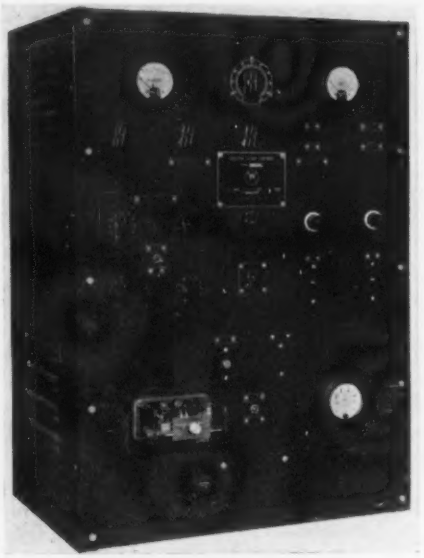
To search out unbalance, which causes harmful noise and vibration in rotating machines, electronic engineers developed Dynetric balancing. By this method, the most accurate ever devised, the amount and location of static and dynamic unbalance can be determined quickly. As an example, duplicate parts can be balanced in a production line in a few seconds. Vibrations as small as 25 millionths of an inch can be located and measured in parts that rotate at speeds up to 8,000 rpm. (See accompanying photograph of this device.)

In Dynetric balancing, the mechanical vibrations are translated into quantities which can be analyzed in electrical networks, allowing the use of amplifiers, stroboscopic lamps and other versatile electronic circuits. Machines may be balanced in the field, in their own bearings, if necessary, it being almost as simple to balance the rotor of the largest turbo-generator as it is to balance a tiny motor.

### Pin Hole Detector

An outstanding example of successful phototube applications is the device shown here for spotting pinholes in metal strips. Units have been in satisfactory operation for more than five years, detecting holes 1/64 in. and smaller in tin mill strips running at speeds up to 1,000 fpm.

The detector consists of an intense light source mounted above the speeding strip, and a phototube housing and amplifier mounted directly below. The phototube housing contains the phototubes, which are connected



40-watt amplifier and control unit with frequency range of 10 to 10,000 cycles comprising part of the electronic equipment used in vibration fatigue tests. Amplifier input circuit may be transformer coupled to the beat frequency oscillator for forced vibration or to the output of the pick-up coil of vibration motor for self-excited operation at a natural frequency of the mechanical system vibrated. Amplifier is a transformer coupled to vibration motor

in parallel through the amplifier to a lock-in control unit. This enables the unit to be sensitive to light impulses lasting only 5 ten-thousandths of a second, which occur at strip speeds of 1,000 fpm.

Holes may be spotted for removal in several ways, by visual indication, by an automatic marker, or by rejection into a classifier after the strip has been sheared. Marking or classifying are most frequently used, since maximum production can be obtained without shutting the mill down for visual inspection of the hole.

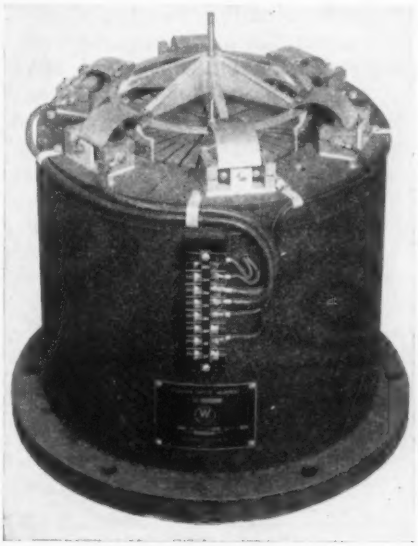
**And So—Tomorrow**

In this final chapter of the story on *Electronics at Work in Industry*, there has been no opportunity to mention many other tools which daily are expanding the services of the engineer. Such other electronic devices include the *Cathode Ray Oscilloscope* which records electrical phenomena occurring in a millionth of a second, and *X-Ray* for analyzing industrial parts and for making radiographs through an inch of steel within a microsecond.

Electronics is a fast-moving art, and it is assured that the present tools of industry will be supplemented with other useful devices in the years to come.

Following is a list of industrial electronic apparatus in successful use today:

1. Regulators to maintain voltage within extremely close limits on generators in the motion picture film printing laboratories.
2. Regulators to keep speeds within close limits on motors driving wind tunnel fans, machine tools and sun telescopes.
3. Ignitron rectifiers to supply large quantities of direct-current for electrolytic processes used in refining aluminum and magnesium.
4. Ignitron rectifiers to supply direct-current to trolleys used in street railways. The oldest ignitron installation in the West is used to supply d-c to trolleys for haulage of ore cars in a mine.
5. Ignitron rectifiers to supply d-c

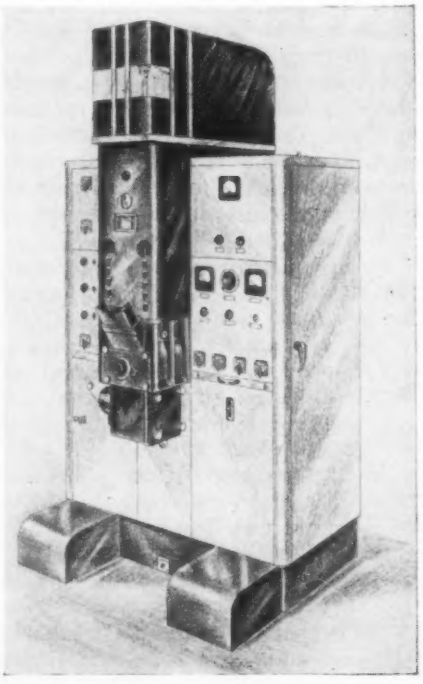


Output of the amplifier is fed to the drive coil of this vibration motor. Construction is similar to a dynamic type loud speaker. Armature spindle is connected to the mechanical system which it is desired to vibrate in fatigue test

to motors used on large steel mill drives, and to cranes and hoists.

6. Mass spectrometers to analyze petroleum and synthetic rubber processes in minutes instead of hours.
7. Control to weld aluminum or light metal alloy parts in the aircraft and associated industries. Without resistance welding, high-speed production of aircraft would be impossible.
8. Light controlled relays permitting accuracy at high speeds in manufacture of bags, containers and wrapping papers.
9. Protection of power systems against damage due to system faults by high-speed carrier relaying.
10. Reflowing of tinplate on sheet iron so that only one-third as much tin is required as heretofore to make a satisfactory protective coating.
11. Preheating of plastics for molding operations.
12. Quick drying of plywood.
13. Operation of d-c motors from an a-c line over wide-speed range and with torque compensation.
14. Close regulation of furnace temperatures.
15. Electronic balancing of rotating parts at accuracies and speeds never before possible.
16. Pinhole detectors in metal strips being inspected and sheared at high speeds.
17. Fatigue machines for producing vibrations over wide range of frequencies and amplitudes.
18. Cleaning of air by an electronic precipitator to a degree never attainable heretofore, and at minimum cost.
19. X-ray equipment for use in industry, as well as in medicine.
20. Cathode ray oscillographs for analyzing troubles in the home radio to transients on the largest power system.
21. Automatic synchronizing of large generators on power systems.

This cathode ray oscillograph can record electrical phenomena occuring in fractions of a millionth of a second. It is used primarily to study the effects of lightning surges on power system high-voltage transmission lines but more recently has been applied to industrial applications, such as checking the electrical firing circuits on high-speed aircraft engines. Spark plug performance can literally be "photographed" by this useful device, thus providing data for improving operation of internal combustion engines



# Sane Electric Appliance Guarantees

*Forrest U. Naylor**
Pacific Gas and Electric Co.

CUSTOMERS misunderstandings about domestic electric appliance guarantees have caused service organizations much concern. It is timely that each appliance manufacturer re-examine his guarantee practices and clearly define his guarantee policy, regardless of the extent he may use guarantees in the future.

Experience with electric appliance service problems has indicated the need for consideration of certain fundamentals. These are outlined as follows purely as a guide for individual review or action by any domestic electric appliance manufacturer.

1. Product guarantees are primarily the responsibility of the appliance manufacturer. However, they impose an indirect responsibility on the distributor and the seller to the ultimate customer.

2. Guarantee commitments should recognize that appliance sales to ultimate customers may be made by various types of sellers handling ordinary retail sales and/or quantity sales to contractors and builders.

3. Guarantee policies, therefore, must be specific as to *who* does what, and simplified as to intent and purpose.

4. Appliances should be sold on their merit without use of misleading and unwarranted guarantees. Any emphasis desired on long life expectancy should be based on features of construction and performance records. However, when it is necessary to have an "extended service or protection" plan, this should have identity separate from the standard first-year guarantee which is not intended for advertising and sales promotion purposes.

5. The standard guarantee or warranty policy should embrace certain fundamentals, namely:

a. The guarantee applies to the complete original appliance and accessories, including parts that may be manufactured by other companies.

b. The purpose of an appliance guarantee or warranty should be to insure against faulty manufacture, or defects in material for a conservative period under normal use.

c. The period of guarantee should be uniform and for twelve months only from date of installation of major appliances, or from date of sale to the ultimate customer of traffic or small appliances and accessories.

d. Should it be necessary to replace a defective part on a new appliance within the first-year guarantee period, this should not extend the guarantee on the appliance or any part thereof beyond the initial twelve months.

e. Enamel surfaces or finish and wire cords should not be "guaranteed;" however, it is understood the appliance manufacturer will be responsible for such being free from factory defects at the time they are received from the manufacturer. Any damage caused by "carrier" is the responsibility of the carrier in all cases.

Although the standard one-year guarantee form should state that enamel surfaces and finish are not guaranteed, should the enamel or finish chip off or "craze" after installation each individual case should be considered on its merit and providing there is a proven defect in manufacture or design, the manufacturers' responsibility to this extent should be stated as a part of his general guarantee policy in his appliance parts catalogue and on record with each seller.

f. The appliance manufacturer should function through the local agent or distributor, if any, in fulfilling guarantee commitments regardless of whether the servicing work is handled by the seller or a recognized servicing dealer.

g. The manufacturer's standard first-year appliance guarantee should stipulate that parts proven defective under guarantee will be replaced or repaired at no cost for such parts, but charges for servicing work necessary to make replacements for the ultimate customer will be subject to arrangement with the seller. However, if the manufacturer's arrangement with the seller provides for a definite servicing responsibility, then the guarantee form issued to the ultimate customer should specifically state that service under the guarantee will be without charge.

6. "Extended Service or Protection Plans" should adhere to the following principles; however it is preferable to use proven quality features and performance records wherever possible.

a. Extended service and protection plans should have separate identity from the standard first-year guarantee and, therefore, omit entirely any use of the words "guarantee" or "warranty" to avoid misunderstandings and abusive practices.

b. The extended service or protection plan should definitely state it applies only to specific parts and *not* the entire appliance.

c. The conditions of the extended service or protection plan should be clearly defined in a certificate

## No. 2 Planning Guide

**of the series being presented here as aids to future planning by the industry. While not in question form, as No. 1, on lighting, was, this guide was prepared after a great deal of work and study of the appliance guarantee problem in the crucible of wartime experience. No period in history ever put policies as to guarantees and repairs to sterner test than this. No situation showed up the inconsistency and the absurdity of many guarantees, nor revealed so dramatically what the buying public thought about them and expected from them. These recommendations therefore deserve to be studied, accepted and adopted by each individual manufacturer in respect to future manufacture.**

*Presented at Pacific Coast Electrical Assn. Annual conferences, San Francisco and Los Angeles, May 10 and 18.

issued to the customer and recorded with the dealer, distributor, and/or manufacturer at the time of sale. This certificate should state whether there will be any charge for servicing and/or installation and transportation costs for parts covered by the extended service or protection plan.

d. Responsibility for extended service or protection plans should be solely that of the appliance manufacturer; however, fulfillment of the plan should be arranged for with distributors and/or dealers by an agreement covering charges and other costs that may be incurred.

7. Extended service or protection plans should be limited to major appliances having definite important features, the failure of which would mean a substantial repair cost. Furthermore, the period of the extended guarantee should be limited to a reasonable number of years regardless of the probable life of the appliance.

The following are examples of recommended standardization for certain appliances:

a. Refrigerators and quick-freeze units

1. The extended service or protection plan should cover a period of four years following the initial one-year guarantee period, and should apply *only* to hermetically sealed units and not other mechanical or structural parts.
2. Extended service or protection plan, whether included in the original selling price or sold subject to a definite charge, should provide for the replacement of hermetically sealed units without charge to the user.

b. Non-ferrous tanks in electric water heaters

Extended service or protection plan for water heaters, using non-ferrous tanks should apply to the tank only and provide for the replacement of it in event of failure within a definite period of years (preferably five years and certainly not "lifetime"), without charge to the user except for installation and transportation.

8. Guarantee of parts for old appliances.—Mechanical or structural parts that are required to replace old parts after the expiration of the initial one-year guarantee period should be guaranteed only to the extent that such parts will operate satisfactorily at time of installation, and if any defects are found due to faulty manufacture or material they should be acted on within 90 days from date of installation.

9. Each appliance manufacturer should provide a parts service and price catalogue to facilitate service maintenance work. This should include a statement of the complete guarantee policy for parts as well as new appliances, and thus safeguard against misunderstandings or abusive practices.

# San Diego Meeting

## Bureau stages meaty sales future planning clinic

WHEN attendance has to be rationed and even so exceeds 225 dealers, salesmen, and wholesalers and manufacturers' product representatives, more than 25 of whom came from out of town despite difficult transportation obstacles to be at the meeting, and when the program is so much in the groove as that which the Bureau of Radio and Electrical Appliances of San Diego usually sets up, the result cannot help but be one of the most unusual and profitable gatherings of a sales group in the industry. Held May 19, afternoon and evening, at the plant meeting room of San Diego Gas and Electric Co., with a buffet style meal between two lively sessions, despite its proximity to the PCEA conference in Los Angeles the day previous, it drew 25 manufacturer and distributor men both to listen in and to participate.

Full justice cannot be done to so practical and interesting a meeting in this crowded issue of ELECTRICAL WEST, particularly to the sound and important report of the bureau's planning committee made by Frank Guasti, its chairman. Nor can it to the selling clinic, introduced by E. W. Meise, San Diego Gas and Electric, and on which were M. G. Sues, vice-president, Leo J. Meyberg Co., Los Angeles; Chris Griffin, manager of a new General Electric distributorship; Burt Dorris, Pacific Coast manager, Stromberg-Carlson Co., San Francisco; Harry Fogwell, president Thermador Co., Los Angeles; and E. M. Frellson, appliance sales manager, General Electric Supply Corp., Los Angeles. Therefore these two features of the program will be covered in full in the July issue.

Turning the front row chairs around, J. Clark Chamberlain, secretary-manager of the bureau, asked all the manufacturer and distributor men to sit in them, facing the dealers. He then quizzed this, the largest jury of manufacturers and product representatives ever to be assembled in San Diego, about future merchandising plans, opinions, predictions and policies. Out of this quiz came the following news:

A description of the new General Electric distribution set-up by Chris Griffin, manager of the distributorship; announcement that a San Diego branch of Thor Pacific would be established as soon as possible; Stromberg-Carlson's policy to distribute direct to dealer instead of through former wholesalers; Packard-Bell Radio's announcement that it would soon establish its own factory controlled distribution with a location in San Diego; Hoffman Radio Corp.'s announcement that although a war-born company with plenty of engineering brains and representing a consolidation of two or three Los Angeles manufacturers, it would be in the field aggressively with domestic radio equipment; other product and postwar plans familiar to the industry.

A. E. Holloway, vice-president, San Diego Gas and Electric, told the group his company did not intend to go back into merchandising except for perhaps some unforeseen need to pioneer something that dealers might not be able to put over profitably. Complimenting the bureau for its active representation of all agencies in electrical sales he pledged continued support of the utility. He suggested formation of committees to develop wiring and lighting. City Manager Walter Cooper told of the business and industrial potential of the region and the need to assimilate the aircraft workers.

Elmer Small, H. L. Benbough Co., chairman of the advertising committee and Forrest Raymond, advertising manager, San Diego Gas and Electric, reviewed the advertising being done by the bureau and pledged its continuance. Paul A. DuPont, Walkers, president of the bureau, ran the successful meeting, reviewing briefly the similar meetings held by the bureau twice a year since the war.

The meeting ended with the spectacular demonstration and talk on the future of lighting given throughout the West by Samuel Hibben, Westinghouse Lamp Co., Bloomfield, N. J.

Guide to future merchandising policy that it is, the full report of the planning committee will be printed in the next issue.

● TO BRING the program for the "home of 194X" which has been developed by the Better Homes Department of Westinghouse Electric & Mfg. Co., Irving W. Clark, Pittsburgh, manager of that department, made a tour of the West in May contacting utility executives and holding meetings with the Westinghouse personnel.

**ELECTRICAL WEST**

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO . 4

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## Wartime Citizenship

NOT many weeks ago a speaker who was addressing a group of electrical people commented on the degree to which men and women in the power companies accept their civic responsibilities. One thing which the war has forcefully demonstrated is just how great a contribution these people make to the communities in which they reside. For, on top of all of the ordinary obligations of good citizenship, the utility folks have assumed more than an average amount of war work.

These wartime assignments, done voluntarily and at a sacrifice of time that might otherwise be spent on personal affairs, run the gamut of every home front activity. This exhibition of patriotism should be an inspiration to the fellow workers who have donned a uniform of war and to those who have stayed at home as well. It is impossible to mention a specific home front war effort without finding a utility man or woman who has made his or her contribution.

Every phase of Red Cross work will be found on the list of activities from blood donorship to canteen work. No community War Fund drive has been without its power company people. The same holds true for War Bond drives. Employees have volunteered to work in fields and to pick fruit crops. They have served on ration boards. Every duty in the air raid warden service has been undertaken. Time has been contributed to salvage drives. Trained people have volunteered for all types of specialized work.

The record of these contributions would encompass every wartime community activity. It bears out the truthfulness of the slogan of the Idaho Power Company as applied to utilities generally—"A Citizen Wherever It Serves."

## Water, Power or Salt?

FOR flood control a reservoir is best kept empty. For power a reservoir is best kept full. For salt water control a river is best kept flowing so that it may push back the tide. In the Central Valley Project upon which the federal government has embarked there are all three necessities. The raging spring floods need controlling to prevent the annual flooding of farmlands. Power must be developed to pay for the tremendous investment in the project. Ample river flow is needed to hold back the sea water from San Francisco Bay and keep the rich agricultural delta region from saline destruction.

But one suspects that power is the favorite and spoiled child in this family of conflicting and paradoxical federal benefactions. Along with power is a twin socialistic brainchild, the limitation of acreage permitted a farmer who gets water from the system to an arbitrary 160 acres. With such favoritism, is it any wonder that the good faith of the entire project is suspect? Just what is the project supposed to be? Is it one designed to attempt to solve a number of problems in water supply, flood control and salinity control, which are major necessities, or is it a power plaything with a rider that would force uneconomic and arbitrary land redistribution, regardless of good sense? Which is the tail and which the dog, and who is wagging which?

## Reducing Re-Wiring Costs

MILLIONS of homes will be denied millions of electrical services and appliances in the postwar era, unless some satisfactory program is evolved to replace the existing copper cobwebs with something far more substantial, electrically at least. Like the fly in the spider's net, the householder who lives in one of the average two-circuit dwellings would of necessity struggle and give up after attempting to fit postwar appliances onto prewar electrical facilities.

The attendant re-wiring job is one which will tax the promotional geniuses of the industry. But it is going to take more than promotion and selling. The economic factors which make the job salable must be instilled into the solution to the problem. And there can be little economic attrac-

tion to the customer at today's labor rates for skilled electrical journeymen, particularly since at least 75% of the re-wiring cost is labor. Thus labor finds itself with the largest stake of all in the huge re-wiring market.

Labor itself is aware of both the opportunity and its responsibility. Labor costs in the form of wage rates which will stimulate re-wiring have been promised by the IBEW for the postwar period. It is refreshing to know that labor is as concerned with breaking the home wiring bottleneck as are other branches of the industry. This spirit is indicative of the type of intra-industry cooperation between management and labor which will insure the preservation of free enterprise.

## Open the Bottleneck

WHILE the manufacturers of electrical appliances, not now able to make their wonted wares, advertise in the national magazines and newspapers that the public may not forget them and their trade names, why not devote a small part of their space to widen the neck of the bottle through which their products sell? Wiring, or rather the lack of it, sets a more definite ceiling upon their future market than OPA, WPB or any other agency could possibly hope for. The home whose wiring is already saturated will be no buyer of new appliances.

Advertising messages these days must all be in the nature of preparation for the future, of cultivating the field, of stimulating postwar wants. Since the wiring adequacy of homes furnished the roots from which the appliances themselves must feed, would it not be well to plant seed for such roots now by telling the public of its need for ample wiring? Advertising space so directed would be the best sort of postwar investment for any appliance maker.

## Television Needs Vision

QUITE a fight has developed over postwar television. In one corner are champions of getting into it as fast as possible with the equipment and the number of lines per inch reproduction settled on before the war. In the other corner are those who advocate waiting long enough to take advantage of war-born developments so that pictures reproduced may be more perfect, be scanned and reproduced with far more lines per inch and possibly employ a wider wave band in another register. This, of course, would make obsolete all the prewar television sets.

Without entering a fight in this new field of the electrical industry, is it not wise to suggest to this group that a lesson be learned from the power industry and its difficulties with frequencies? Without unanimity the early systems were established in various parts of the nation, some with 25-, some 50- and some 60-cycle alternating-current. At the time and on the scale begun this was not important. But with growth and eventual interconnections this proved costly and it limited interchange.

When the city of Los Angeles decided it should change over to 60 cycles, it cost several million dollars not only to change its own equipment but that of all of its consumers. Growth had made the changeover exceedingly expensive. The Southern California Edison Co. is contemplating a similar change and knows that it will cost about $16,000,000.

If the television industry is to make any changes in wave band and in number of lines per inch, now is the time when it will be the cheapest for all concerned. Comparatively there are very few sets yet in use. The changeover will hurt less than the change from battery-operated radio to alternating-current radio did, and far less than from amplitude modulation to frequency modulation will. This lesson from the electrical industry's past is one the television group will do well to heed at such a propitious time as history has made for it.

*ALWAYS remember this: the day the armistice is signed, the public—your public—won't give a tinker's dam that you helped the war effort—that you kept homes and businesses and industries supplied with juice and fuel or that you did the job in the face of insurmountable obstacles. If you have any letterheads left over with Army-Navy "E" flags on them, give them to the office force to use as confetti at the armistice day celebration. When the war is over, your public utility will once again be on trial. It will have to justify itself, sell itself all over again and advertise itself all over again. Furthermore, 3 billion dollars has been spent to increase existing generation, transmission and distribution capacity. Your total generating capacity will exceed the highest demands of the war load by 9 million kilowatts. So you can get some idea of the gigantic selling task facing the electric end of your business . . . Remember that markets are people. What people think—their likes and dislikes—their ambitions and hopes—are going to be the keys to postwar success or failure of all business enterprises.*—Arthur P. Hirose, director of promotion and market research, *McCall's* and *Redbook*.

# PCEA Looks Into the Industry's Future

## Administrative Section into personnel, Business into sales policy and potential, Operating into population and system modernization

PROVING again that in time of stress and strain men need the counsel of their fellows engaged in like activities and are fired to new capacities by the inspiration that comes from a large meeting, the Pacific Coast Electrical Assn. has just completed two annual spring conferences in San Francisco, May 10, and Los Angeles May 18. These took the place of the former annual convention, eliminating the need for transportation and drawing to each meeting the electrical industry members from the immediate surroundings for a single-day, concentrated program on an almost identical list of subjects.

In calling together the third series of annual meetings under war restrictions President Frank C. Angle, Allis-Chalmers Co., commended the industry for its gain in stature during the emergency. "I can see the tide of public opinion flowing against bureaucracy in favor of free enterprise, the 'fifth freedom,' and against philosophies of foreign origin in favor of government by law. I know of no industry which was so well prepared for war. Let us be equal to the demands of peace. Let us face postwar, not as a hazard, but as an era of unlimited possibilities."

Except for the noon luncheon, which was a general assembly of all attending, the day in each case was spent in parallel sessions of the Administrative Services, Business Development and Operating Economics sections. Attendance at the San Francisco luncheon was over 400, the Los Angeles luncheon 350. At each, in addition to the brief report of President Angle, an inspirational speaker from outside the industry spoke.

Ernest Ingold, originator of the "workpile" idea for postwar rehabilitation and re-employment as past president of the San Francisco Chamber of Commerce, told of the 1,200 government employees planning a postwar world in Washington and the need for business to plan its own future. "Let us sell the enterprise system we all love," he said. The wartime restrictions will have to be lifted one by one in order to restore freedom. Speaking of the fundamental nature of striving to make a country prosperous, as against the mistaken idea that it can be legislated into wealth, he said, "The time will come when the bottle of milk on the doorstep will be earned by sweat, and if there is a bottle of cream alongside it, that too will have been earned by extra effort . . . Only those who make and sell have ever produced a surplus economy."

Verne Orr, vice-president, Chrysler Motors of California, told the Los Angeles group some of the things American industry is doing toward victory and gave valuable suggestions for "after victory". As an example of the ability of free enterprise to convert and produce, he cited from the wartime record of the auto industry.

Strength of free enterprise in the postwar era is going to depend on our ability to employ men, he declared. "Manufacturers are going to say, 'I can make anything you can sell.' The sales department, therefore, has a challenge to keep free enterprise going." In urging industry to look after its sales departments and turn out better trained men, he pointed out that those who hire and train must take some responsibility for a poor sales job.

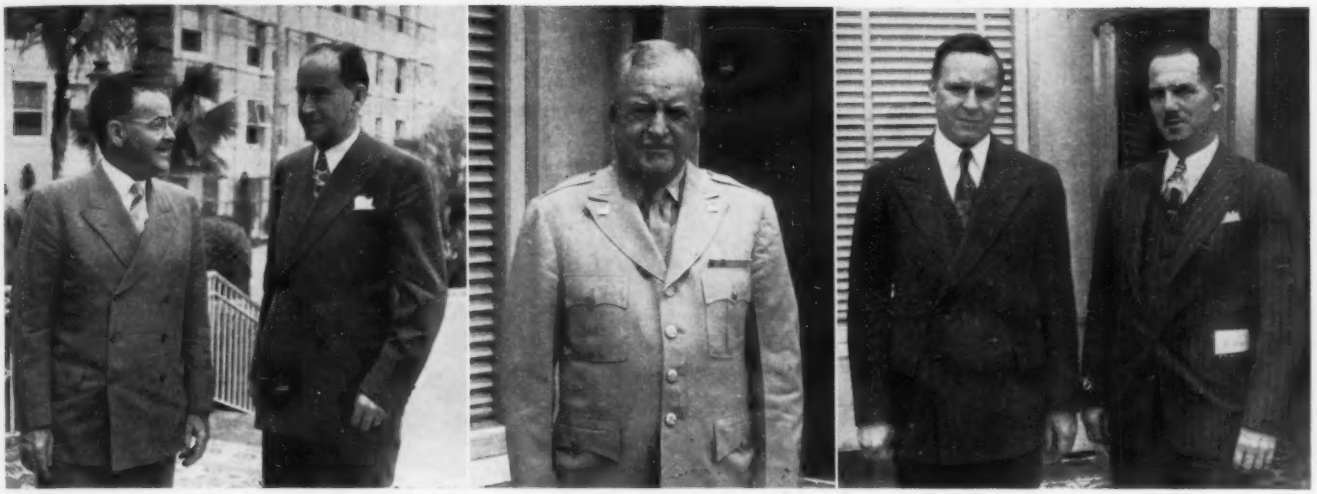
Hance H. Cleland, president, San Diego Gas and Electric Co., was elected the new president. In accepting the job Cleland served notice on the membership that his own personal crusade might be sold to them before the year was out because he felt very deeply about it. (See p. 112)

Also elected were the following directors: I. W. Borda, The Okonite Company, San Francisco; H. H. Courtright, Valley Electrical Supply Co., Fresno; P. M. Downing, Pacific Gas & Electric Co., San Francisco; Charles Grunsky, Coast Counties Gas & Electric Co., Santa Cruz; Harry L. Harper, Graybar Electric Co., Los Angeles; C. E. Houston, Southern California Edison Co., Ltd., Los Angeles; A. G. Jones, General Electric Co., San Francisco; M. G. Sues, Leo J. Meyberg Co., Los Angeles; W. G. Willson, Westinghouse Electric & Mfg. Co., Los Angeles.

Summarizing the year's membership

P. M. Downing Hance Cleland

R. M. Alvord Ernest Ingold F. C. Angle



George Rankin H. H. Courtright Col. L. V. Sheridan W. S. Peterson C. M. Allen

increases and the association's committee activities, Victor Hartley, managing director, prepared a brief report which, however, was nowhere given in the conferences because of lack of time. In it he told of a 5% increase in membership, the total being 2,128, including a special class of members now in the armed services.

Committee activities on specific projects have included the code and ordinance committee's work toward the adoption of the uniform electrical code and unsafe electrical appliance ordinance. The uniform code has been adopted as wiring regulations in 23 cities, with earlier editions in effect in 42 others. Today, 64 cities operate under the unsafe electrical appliance ordinance. The adequate wiring committee, in cooperation with electrical inspectors, has asked the Electrical Committee, NFPA to revise the National Electrical Code to require a minimum of 20 amp. branch circuits for domestic occupancies, with No. 12 wire as minimum.

Participation in the Home Planning Institute program has already been described in these columns. A chart to aid loaning agencies to determine the amount that should be earmarked for wiring is also being prepared.

The editing committee on the industrial power and heating handbook has prepared a supplement for holders of the handbook. The planning committee has aided other committees in their plans for postwar conversion and is studying potential manpower needs in the electrical industry. The industry information committee is studying available means of disseminating information in lieu of the district meetings which have had to be discontinued because of travel restrictions.

Managing Director Hartley was appointed a director on the IAEL board.

## Operating Economics

*E. A. Crellin, Chairman*
*Pacific Gas and Electric Co.,*
*San Francisco*

*E. W. Morris, Vice-Chairman*
*Westinghouse Electric & Mfg. Co.,*
*Los Angeles*

SUBJECTS presented at both north and south one-day conferences of the Operating Economics Section dealt primarily with future developments and needs of the electrical industry. These ranged from the power outlook to population and load forecasting, history and trends of labor legislation, gas turbine developments, equipment modernization and energized line maintenance.

Emphasis will continue to be placed on hydro development in the future as it has been in the past in the eleven Western states, stated George C. Tenney, president, McGraw-Hill Company of California, in opening the morning session with a discussion of the *Pacific Coast Power Outlook*. Less profligate waste of our petroleum resources in the future, coupled with almost certain higher fuel costs, will re-focus attention on the West's tremendous hydro resources, 66.7% of the potential for the United States.

Continued operation of the two war-born power pools in the West, one in the Pacific Southwest with capacity of 4½ million kilowatts, the other in the Pacific Northwest, embracing eleven systems with generator capacity of 3½ million kilowatts, will have an important bearing on future developments. These two pools, embracing eight of the eleven Western states, will permit future power developments to be made on a regional basis rather than on an area basis, with due regard to the most economical sources. Power pools have clearly demonstrated that private, federal and municipal systems can operate economically and on a cooperative basis with maximum reliability and minimum power costs.

Fears of a long postwar period of no further power developments in the West were allayed by Tenney when he pointed out that the approximate million and a half kilowatts of capacity that will be made available for general use by the cessation of war activity represents only a normal three year's growth. Since utilities anticipate load demands by at least two years, the slack period in power development should be of short duration.

He concluded by saying, "It is conceivable that new equipment under development and experimental work being conducted, much of which is of a highly secret nature, may reveal secrets about energy and electricity, which, when they become known, will make our present methods and equipment obsolete."

*Population, Load Forecasting*—Demands upon any utility for electric service depend on the number of inhabitants, the degree to which their electrical appetite for electric service has been developed and the ability of the utility to satisfy this appetite and stimulate it further, declared J. D. Enefer, Southern California Edison Co., in a paper on population and load forecasting for effective system planning, an abstract of which appears on page 82. From Edison's many years' experience in forecasting load growth, it has been determined that kilowatt-hour consumption per capita is the best criterion upon which to prognosticate future growth and lay system plans.

*Labor Legislation, History-Trends*—Every generation thinks that its labor problems are unique, but history has a way of repeating itself, said L. J.

Nevraumont, in discussing *Labor Legislation, Its History and Trends.* The present wage and hour law really penalizes the employer for working a man more than 40 hours a week, he said.

He pointed out the undesirable effect of the present law in that the "cooling off" period actually became a "boiling up" period instead. Significant is the fact that lost time from strikes has increased from two million man-days in 1942, to a probable five million in 1944. The effect of this law is generally agreed to be undesirable and something undoubtedly will be done about it after the war.

He stated that most of our labor laws are not enacted by Congress, but are directive orders, there being seventeen directive orders affecting labor relations today. Congress can control bureaucracy through appropriations. The moment money is appropriated to a bureau, it feels it has government sanction for its policies. The easiest way to throttle bureaucracy is to take its money away from it, and he believes the mortality rate of bureaus will be high after the war.

It is his opinion that labor, too, is opposed to too much law and too many directives. As evidence he quoted the following recent statement by Bob Watts, international representative of the AF of L, "we must agree upon self-rule to the maximum through the delegated representatives of management and labor, rather than by the rigid dogma of statutory law. We must operate through agreements among ourselves, meeting practical problems by realistic application of practical policies. Should we fail, we are confronted by the static blindness of rigid law and the directive of the dictator."

*Gas Turbine Development* — In a joint meeting with the Business Development Section, Frank C. Angle, president of the association and Pacific regional manager, Allis-Chalmers Mfg. Co., gave an interesting report on the history and development of the gas turbine. The gas turbine is not an invention of modern times. For over 2,000 years scientists have had the so-called hot air engine under consideration. Many laboratories and companies can claim a share of the credit for its design and development.

Progress has been retarded by lack of development of related apparatus, he said, principally the lack of a high efficiency compressor, and most recently by limitations in metallurgy. Recently the gas turbine has been given much publicity, partly due to the halo of secrecy surrounding some of its applications. The majority of the devices of this type being built today are being used as expendable engines of war. Wartime uses, such as for high octane cracking plants, high flying aircraft and on ships of certain types have so greatly accelerated development that the gas turbine looks promising as a postwar prime mover, particularly in units up to 5,000 hp.

Great advances have been made in the thermal efficiency and with the use of re-heat cycles and temperatures of 1,500°F., the gas turbine will exceed in efficiency our highest economy steam turbines and equal that of the Diesel. Those charged with the responsibility for carrying on this development have much work to do, however, before the gas turbine can be put on a peacetime basis.

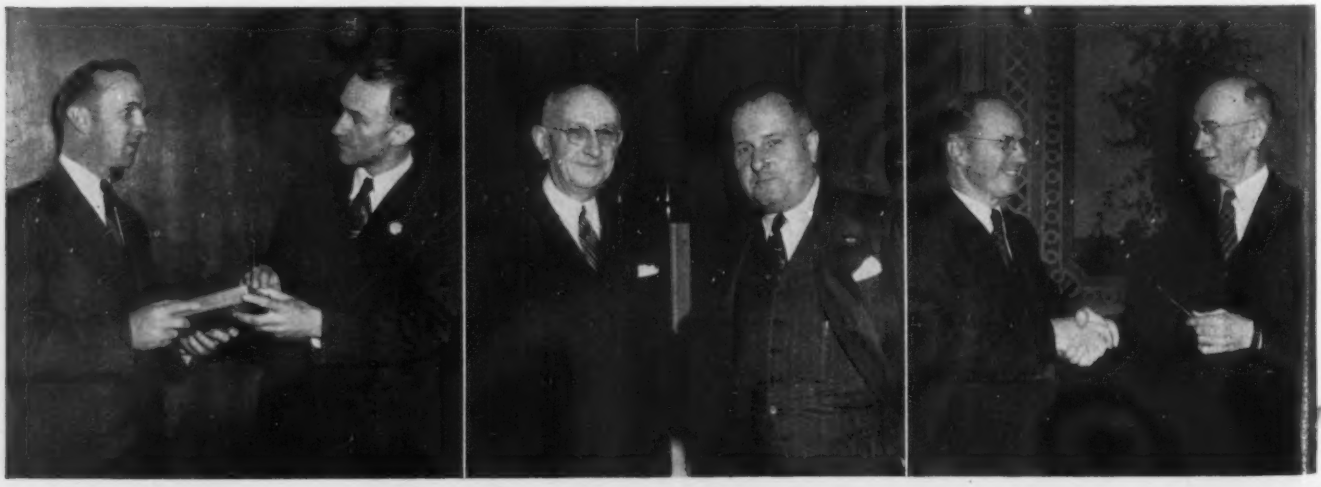
*Equipment Modernization* — Some blueprinting for postwar modernization should be undertaken, and each utility should develop a modernization or planned repair program for its older equipment which it can put under way when the war ends, said O. A. Gustafson, General Electric Co., in presenting a paper on *Modernization of Rotating Equipment.* His paper cited three specific cases where modernization of rotating equipment had increased capacity, reduced losses and forestalled breakdown, to prove the importance of carefully checking all types of power system apparatus and adopting a planned repair and modernization program.

*Live Line Maintenance*—A colored film entitled *Safety Through Training* was presented by Howard Miller of the Southern California Edison Co., which illustrated the training program which his company developed to teac men engaged in live line maintenance. The fact that the accident record while performing this type of work is better than when doing other kinds of work may be partly due to the nature of the work and the fact that the lines are energized which keeps the men alert. However, he believes that the main contributing factor is the training programs his company has set up.

This training program is simple but effective. The men are first taught on unenergized equipment, on dummy lines and structures built for the purpose. Here they are taught to use the tools at a safe working position. On special jobs, additional training is given by an instructor working in the field with the men. This type of instruction is carried on until the men are capable of handling jobs without assistance. Foremen, also, are instructed and assisted in planning the job, special attention being given to safe working conditions, with particular stress laid on direct supervision of men doing this type of work. A number of questions concerning materials used and methods that followed showed a live interest in the subject under discussion.

E. R. Perry, industrial consultant, reminded the Los Angeles meeting that the labor laws under which industry works today were largely framed, lobbied and forced by labor organizations and not by employers. Because of this, employers have been on the defensive

E. W. Morris O. A. Gustafson H. L. Harper W. Glosser Charles Grunsky A. G. Jones



continually. To the difficulties and minor confusion caused by endeavors to operate under a multiplicity of federal and state labor legislation has been added the chaos of trying to conform to administrative laws based on executive orders, he declared. Interpretation has been piled on interpretation, he said, with only the very beginnings resting on any legal statutes. He confirmed present indications that clarification of the whole labor picture is going to come from Congress.

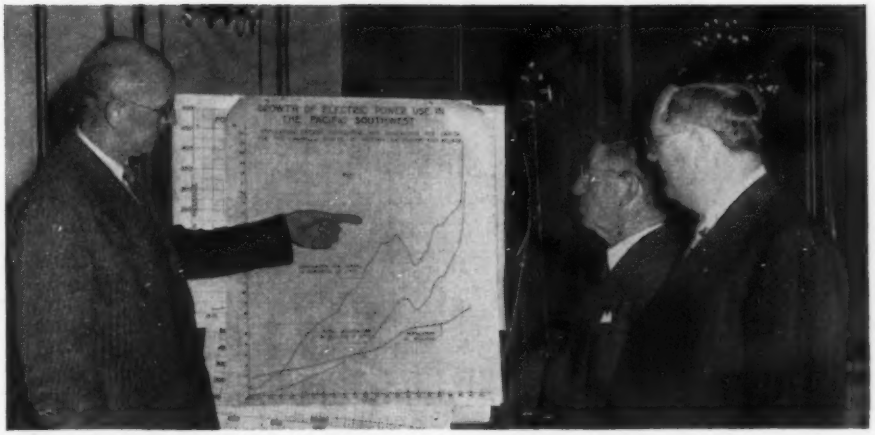
Maintenance of service for Army posts of the Ninth Service Command, with special emphasis on electrical facilities, was discussed at the Los Angeles meeting by Col. L. V. Sheridan, CE, assistant service command engineer. Proportions of this job are indicated by the extent of the facilities —5,280 acres of roofed buildings, 87 acres of wharves and ferry slips, 34,000 acres of roads, runways and taxi strips, 1,155 miles of railroads, 2,175 miles of water mains and 3,090 miles of electric lines. Col. Sheridan paid high tribute to the electric utilities of the area for the cooperation and services they have furnished and cited a commendation from the Chief of Engineers on the effective application of the Utility Wartime Aid program in this region. He commended the utilities for the aid they gave in conducting a series of electrical schools for maintenance personnel and for the manner in which cases of trouble have been cleared.

**Transportation Group**

Resumed again after some years of inactivity were meetings of the transportation group at both conferences. That in San Francisco was headed by E. C. Wood, PG and E, San Francisco, and that in Los Angeles by Clarence Rhudy, California Electric Power, Riverside. Transportation difficulties during wartime have increased tremendously because of gasoline and tire restrictions, mileage quotas, repair parts shortages and changes in quality of fuels.

A program thoughtfully prepared to bring late and authentic information from qualified experts was presented at each meeting. In San Francisco Wood had as speakers S. B. Shaw, automotive engineer, PG and E; Russell A. Watson, Federal Mogul Corp.; George Neeley, Standard Oil Co. of Calif.; Grant Wheeler presenting a paper by Charles F. Becker, Associated Oil Co.; Dave Elliott, Goodrich Tire Co.; and C. R. Stanley, PG and E.

Shaw outlined briefly activities and functions of ODT and explained his own position as regional maintenance consultant, Region Five, and discussed the various limitation orders pertaining to fleet maintenance.



J. D. Enefer F. R. George Walter Willson

With a long experience in bearing design, manufacture and application, Watson told of the present-day situation as to replacement of bearings and discussed the future outlook in this important phase of transportation equipment performance.

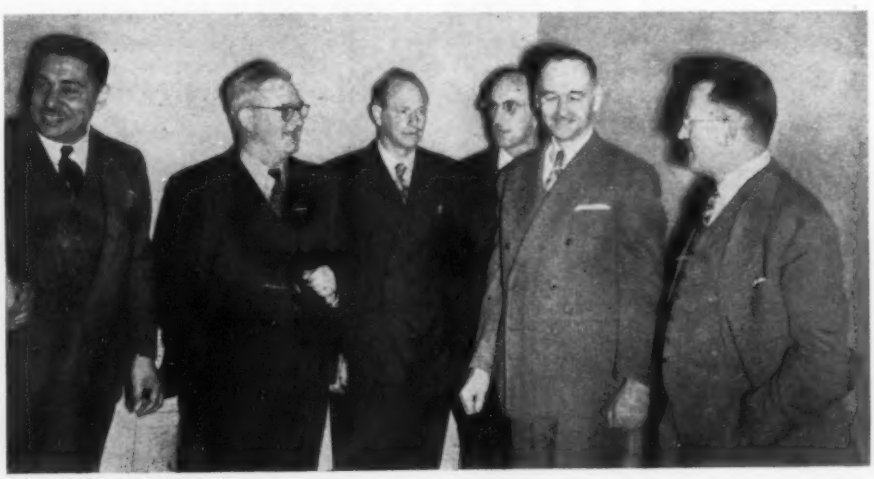
Neeley gave an interesting presentation on heavy-duty lubricating oils, covering present-day oils and describing the oils which may be expected in the future. The heavy drain on oils by the armed forces is causing substitutions in oils for domestic uses and these have different performance characteristics, which he described.

Becker's paper reviewed the history of gasolines and of the types of engines that had been designed to operate with each change. Touching on such characteristics as volatility, anti-knock value, distillation curves, initial starting tests, warm up tests, crank case dilution, he gave about 20 suggestions for present-day driving. In concluding, Becker sketched the prospects of higher octane ratings and anti-knock characteristics in the postwar fuels derived as a result of wartime high octane airplane gasoline development and equipment.

Synthetic tires were discussed frankly by Elliott in the afternoon session. Tires having 50% crude and 50% synthetic give about 85% of the former all-rubber mileage. Present retread stock gives about as much service as previously furnished retread materials. The tire situation is critical. The maintenance of quotas in the larger sizes especially is endangered. Every tire carcass should be guarded carefully; it means success or failure, Elliott declared.

Preventative maintenance was Stanley's topic as he outlined the inspection system used by PG and E. He covered the subject from the standpoints of (a) present available data from inspection reports, (b) frequency of type of inspection of component units and assemblies, (c) shop man-hours in relation to frequency, (d) loss of use of vehicle due to road failure. "These studies," he said, "should determine the value of each and its relation to cost; and decide procedure, which should be economically sound yet be

S. Onorto, S. B. Shaw, C. R. Stanley, G. Wheeler, George Neeley, J. MacGregor



M. G. Sues

sufficiently flexible to meet present conditions and to fit any future developments." He also talked of shop practice and driver training.

The meeting ended in an open-forum discussion on motor vehicles and trucks and on shop and garage facilities analysed as to the present and the future.

At the southern meeting in Los Angeles, under C. H. Rhudy, the speakers were E. W. Templin, Los Angeles Department of Water & Power; J. O'Hara Smith, Standard Oil Co. of Calif.; W. P. Sheehan, ODT, San Francisco; Paul Dill, ODT, Los Angeles; F. L. Ryan, OPA, Los Angeles.

Templin outlined procedure when preparing passenger cars and trucks for storage for an indefinite period, including cleaning, moth proofing, waxing, lubrication, radiator protection, fan belt tension, fuel system protection, battery removal and tire protection. Smith told of lubricants and especially those to protect engine, differential and transmission gears.

Both ODT men outlined the situation regarding obtaining new trucks and parts, discussing the situation in view of military necessities. ODT aids in finding parts after all efforts to locate any locally fail. Ryan of OPA discussed the tire situation, telling of the problems connected with producing synthetic tires and their subsequent life. Truck tires present one of the most critical situations in the entire transportation situation.

The afternoon session was a round-table discussion of transportation, tire and gasoline rationing ideas and problems.

## Business Development

*Percy P. Pine, Chairman*
*San Diego Gas and Electric Co.*

*Milo Cain, Vice-chairman*
*Coast Counties Gas and Electric Co.*
*Santa Cruz*

BEGINNING with the "bottleneck", wiring, and ending in a blaze of lighting glory destined for the future, with consideration of appliance servicing and guarantees, the future of agriculture, the potentialities of the gas turbine, the direction of appliance merchandising distribution and a report of the recent EEI conference in between, the Business Development Section crowded a great deal into very little time. To compress the full range of the commercial end of the industry into so small a capsule was something of an engineering feat itself but Chairman P. P. Pine, San Diego Gas & Electric, is engineer as well as salesman.

Steady growth in adoption of the unsafe appliance sales ordinance prepared by PCEA was reported by Ben C. Hill, superintendent of the Electrical Division, Oakland, chairman of PCEA's code and ordinance committee. When he last reported in November, 24 cities had adopted the ordinance; 16 previously had ordinances. Since last November the total has grown to 46 cities, 14 having previous ordinances—two having changed to the PCEA ordinance—and eight more are preparing to adopt the ordinance. Ben Hill recommended that consideration be given toward having the state legislature enact a state law prohibiting the sale of unsafe or unapproved or substandard appliances and devices.

Along three fronts the adequate wiring committee is moving to establish beach heads for the postwar drive to open the way for wiring adequate to serve the multitude of future uses of electricity. These three fronts were discussed at the San Francisco meeting by J. A. Hill, PG and E; at Los Angeles by H. C. Rice, So. Cal. Ed., chairman of the committee. Enlarged from five to 14 members the committee has three projects. First, at the suggestion of an advisory committee from the inspectors association, a resolution has been addressed by PCEA to NEMA, NEWA, NECA, EEI and to the Electrical Committee, NFPA that the National Electrical Code be amended to restrict domestic circuits to a minimum of 20 amp. and No. 12 wire. Endorsement of the program has been given by all but two of the many local leagues, associations or organizations to which the resolution has also been sent. Seventy were sent out. There have been 27 replies; 15 have endorsed it, seven have it under consideration, three merely acknowledged it and two have refused to endorse it, both from the East.

A request has also been made to manufacturers to include in their national advertising, during this period of no-product-to-sell, the advice to consumers that wiring will make possible enjoyment of the new devices of the future. A wiring appraisal chart is also in preparation for the convenience of real estate appraisers, the FHA, loan agencies, banks, etc., by which to estimate and earmark the proper percentage of the home building loan (4% of the total) to provide for an adequate wiring job that will safeguard the investment.

Most spectacular activity of the committee has been its active leadership in the Home Planners Institutes held in southern California during the spring. There are plans for probably 25 more in the fall in the same region and another 25 in northern California. ELECTRICAL WEST has reported on these as they have progressed.

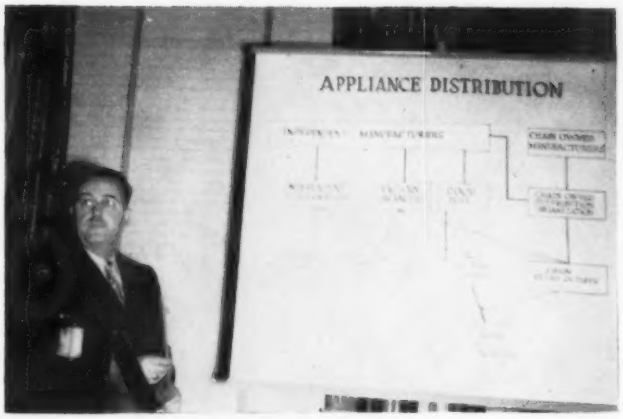
D. D. Wheelock Si Frellson P. P. Pine Dr. Walker M. W. Phillips Ray Green A. D. Brown

Appliance guarantees and service periods have been studied for over a year. Forrest Naylor, PG and E, presented a paper, published in full on p. 102 of this issue, recommending to manufacturers a sane policy in regard to guarantees. C. L. Moore, Chicago Flexible Shaft Co., Los Angeles, presented the paper at the southern conference.

That in California for every tractor drawbar horsepower delivered to a farm implement there is consumed on our farms a kilowatt-hour of electrical energy, was the surprising summation made by H. B. Walker, who heads the California Agricultural Experiment Station for the University of California at Davis. He predicted two types of farming in the future; one a continuance of the large-scale industrialized farm which produces foods, and materials for industry derived from agriculture, on a highly efficient scale with a minimum of manpower and a maximum of mechanization; the second a spread of small semi-farming homesites surrounding all industrial areas, where the workers, on a shorter postwar work week, may enjoy the opportunity to work small plots of land for partial subsistence. This, he did not feel, will affect large-scale farming but will satisfy the urge of an increased number of industrial workers for a touch of rural life, while their main income will be derived from industry. The electrical uses on both types of farming operations he discussed in his talk on *Postwar Rural Electrification*. He concluded by describing the type of salesmen that such farm electrification will require.

R. E. Fisher, vice-president, PG and E, San Francisco and R. C. McFadden, sales manager, So. Cal. Ed., Los Angeles, respectively, reported on the meetings of the Commercial conference and the power sales conference of the Edison Electric Institute in Chicago, recently, and on the American Chemurgic Council meeting which they attended also. A movement to change the nomenclature of the industry abolishing the term kilowatt, among others, and substituting "units" instead, was described. A Disney film for instruction of the public was highly commended. (It had been scheduled to be shown to these two meetings but a previous dating prevented it.)

S. G. Hibben




B. W. Reynolds

Postwar competition from gas engines and diesels, both men reported, may be expected to be more intense than ever before. Farm electrification in the East is still in pioneering stages. Plans for coordination of the industry for postwar promotions were discussed. Merle Skinner presented a many sided program for developing the idea of electrical living in the home of the future. McFadden himself presented a paper on *What's Ahead in Lighting*. The potentialities of frozen foods were elaborated by Mr. Birdseye, one of the originators of the idea.

*A Report on Gas Turbine Development and Application* by Frank Angle, presented to a joint meeting of both Business Development and Operating Economics sections, is described in the report of the latter section herein.

*Future Appliance Distribution*, as might be expected, was handled from two different points of view by B. W. Reynolds, manager domestic sales, PG and E., at San Francisco, and M. G. Sues, vice-president, Leo J. Meyberg Co., Los Angeles.

Reynolds indicated by a chart the various levels and channels that have been used in the distribution of merchandise in the past saying that no changes in these could be expected but changes in the relative value of many or changes in the channel selected might result from the study all manufacturers seem to be making of their future distribution. What percentage of future merchandise will go through chain outlets would be determined by their efficiency in distribution. Those in competing steps in distribution must be competitive, he declared, for manufacturers have a rare opportunity now to change forms of channeling if they wish. He enunciated as a principle this statement:

"The principal volume, in the end, will flow through the most economical channels to the types of outlets through which the most people will buy."

If this applies to the chains, the chains will get the volume. But the independent will have brand name and prestige to compete with. It is doubtful, Reynolds said, whether the public will be willing to pay much of a premium for the brand name alone. When the chains gain the acceptance of the customer to the extent of thinking that "it is the thing to do" to buy from a chain, the brand name advantage will be lost. There is a limit, he said, however, to the squeeze that can be placed on margins if independent dealers are to compete.

Merchant builders, Reynolds averred, might be expected to be dealer competition, selling completely equipped homes in a package on long terms that include the appliances, buying the appliances themselves direct from manufacturers. As an example a $4,000 home on FHA terms requires $500 down, payments of $35 a month. Electrical equipment totaling $500 can be included for an additional $55 down and $2.50 a month.

Altogether, Reynolds concluded, with cooperatives, the prospect of large numbers of new dealers set up after the war and other changing conditions, the distribution picture deserves study by all. It presents a challenge to America's entire distributive mechanism to prove its value.

Sues talked of distribution from the very center of it, with all the experience and study an alert distributor has given the subject.

To bridge the gap between manufacturer and consumer the various links in the distribution chain are made. On the surface it would appear that direct to consumer would be least costly but appliances require selling, advertising, servicing, control, warehousing and transportation. Even Fuller Brush and Real Silk are no cheaper than same grade competitors. Old-time direct vacuum cleaner sales required higher prices to the consumer. When put through distributors prices came down.

F. C. McLaughlin

Both factory branches and independent wholesalers have the same functions. Their comparative efficiency depends on the human element. Generally factories like a certain percentage in owned branches to test and prove ideas and policies or where local distributors are not satisfactory. Cost economy is in favor of the independent who can distribute overhead over many lines.

Chain stores, Sues felt, are frightening many needlessly. They are well suited to certain classes of manufacturers. They are ideal outlets for a factory not properly capitalized or which does not want to enter distribution with its selling, advertising and risks. Independent distributors give better blanket coverage of the field. At the most the two major chains have only 130 stores in California which is not enough, except in trading areas, for full distribution.

As to distribution costs Sues pointed to the 1939 and 1940 refrigerator situation. In 1939 there was a $60 gap in price between chain store refrigerators and standard brand makes and chains did 25% of the total. Kelvinator decided to simplify its line to match the two (instead of 16 models) competitive models which take care of 85% of the market. By lowering the boom on prices and discount it caused a sensation, but everyone followed. All survived, even though complaining, and chains only did 17% of the volume in 1941. Sues said he believed margins would hold because the water had been removed. Reduced margins had forced out bad trade-in practices and had increased efficiency.

"Necessity made us look ourselves over. We had been indulging in many luxuries which we had to cut out and we will have to cut out more things that do not count. The human element is involved in all this. I believe the challenge can be met."

Samuel Hibben, director of applied lighting, Westinghouse, closed both conferences with showmanship while he described market possibilities in the lighting field. With a tableful of lamps and fluorescing and phosphorescing properties he did everying from fry an egg on an infrared lamp to produce spectacular color effects with ultra-high ultraviolet light. Touching on wartime developments in lighting materials and techniques he translated many into peacetime possibilities for the future. Many are possible but still uneconomical or impractical but they do hold promise of future improvement.

He closed by saying pointedly that these promising applications of light and lighting equipment may be unattainable unless the copper cobwebs of inadequate wire (and he mentioned No. 14 especially) are replaced by heavier circuits.

## Administrative

*F. C. McLaughlin, chairman*
*Southern California Edison Co.*
*Los Angeles*

*H. A. Lee, vice-chairman*
*Pacific Gas and Electric Co.*
*Stockton*

THAT utility management is conscious of a moral as well as a legal responsibility to employees returning from military service was evidenced in the Administrative Services Section, which studied the problem at both northern and southern meetings. Employee training and customer relations were other topics which came in for discussion.

Headliner was Hance H. Cleland, president of San Diego Gas and Electric Co., who admitted at the outset that he wanted to sell an idea. This idea, it developed, is a program, "not a job but a lot of fun," that can pay dividends in cemented friendships and loyalties, higher soldier morale and elimination of the soup kitchens and "no job" signs which followed the last war.

Taking the attitude that the company's 201 employees on military leave (16% of the company pay roll) are "away on company business," Cleland follows a regular program designed to keep them informed about company affairs, to keep the company in touch with the man and the man with the company through personal letters, to relieve in so far as possible anxiety about families at home. Instituted soon after Pearl Harbor, the program was instigated and formulated by Cleland and is largely carried on by him personally, although it is growing steadily and therefore constantly takes in more people at home.

The program starts the day the man leaves for the service and continues until he returns. Presentation of a purse containing $100 and a memo book with his leave of absence is the first step. The family is given a scrap book, a blue star pin and a letter telling of the committee formed to aid them during the man's absence.

To personalize the letters which go regularly from Cleland to men in the service, a card file records hobbies, interests and other facts. Supplementing these letters, are a paper edited especially for employees in the service; sport sections clipped from local news papers; Christmas and other gifts. Fellow employees also are urged to write.

While legal responsibility is defined in the Selective Service Act, certain interpretations are to be made. To clarify the company's position, a 2¼ x 4-in. booklet has been prepared and is in the hands of supervisors and other key people. It has not yet been sent to service men. In preparing this booklet, care was taken to avoid the use of the word "rules" and to substitute "policies."

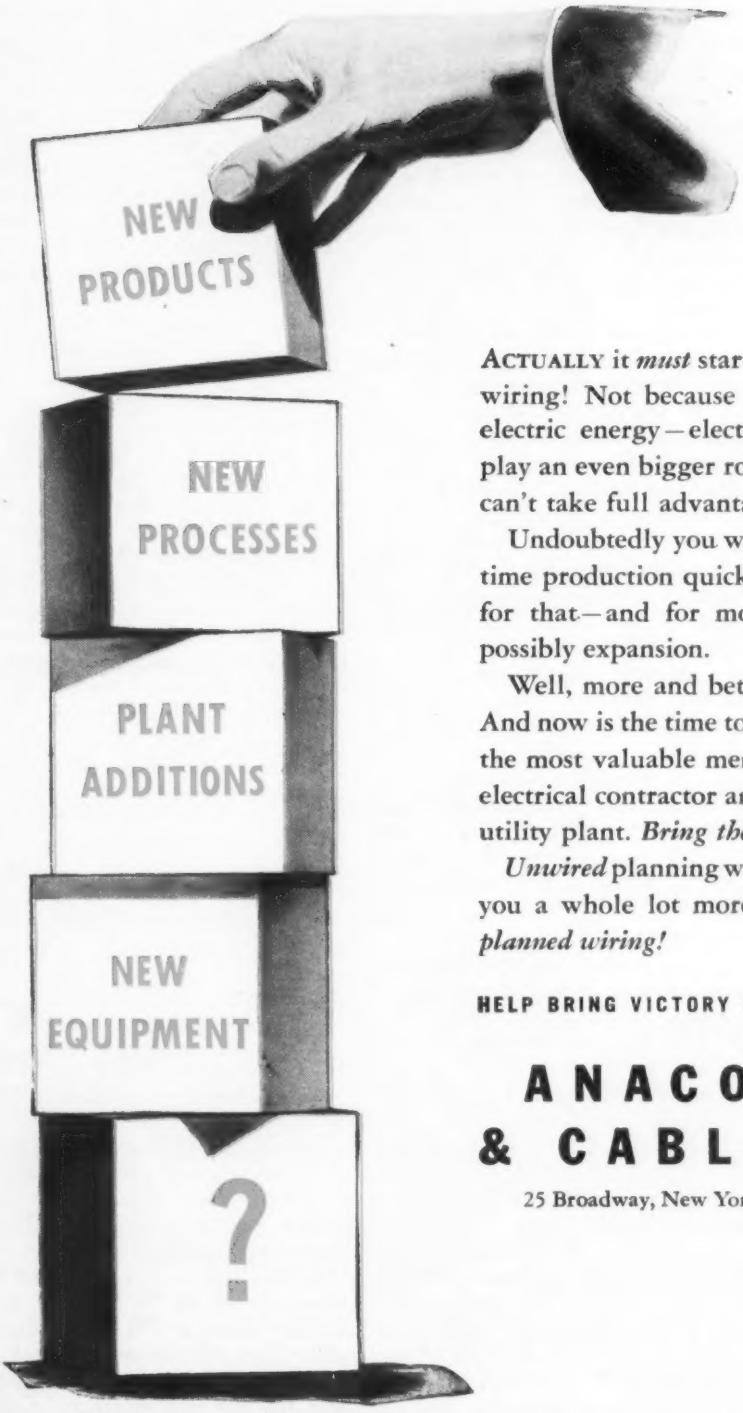
San Diego Gas and Electric defines a permanent employee as one who has been with the company for one year. All persons employed since Pearl Harbor have been employed for the duration only. If application for re-employment is made within the 40-day period specified in the Selective Service Act, the company on the employee's request, will grant him a further leave up to 60 days. If a returned soldier has during his absence lost a chance to bid for a higher job, he will be given the chance when he returns, provided he has the skill to quality. If he wants advancement due to a new skill acquired, however, he must follow the present transfer rules. Sick leave will be credited, with five days for each year of service with the armed forces.

San Diego Gas and Electric plans to employ, as assistant personnel director,

F. A. Tracy L. J. Nevraumont

*(Here's another ad in the series that brings a vital message to your customers.)*

# Know where that postwar plan of yours ought to START?




ACTUALLY it *must* start with electrical wiring . . . *adequate* wiring! Not because we think so—but simply because electric energy—electric-motorized power—is going to play an even bigger role in postwar production. And you can't take full advantage of it without the right wiring.

Undoubtedly you want to swing your plant into peacetime production quickly after the war. You've got plans for that—and for modernization . . . improvements . . . possibly expansion.

Well, more and better wiring will have to come first. And now is the time to plan for it—in advance. Just about the most valuable men you could talk to today are your electrical contractor and a power engineer from the local utility plant. *Bring them into the advance planning stage.*

*Unwired* planning will cost you a whole lot more than *planned wiring!* 44226

**HELP BRING VICTORY SOONER . . . BUY MORE WAR BONDS.**

## ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4 . . . Sales Offices in Principal Cities

ANACONDA

*Electrical Wires and Cables of Copper are the Life Lines of our Nation*

a former service man, who will be able to understand and assist the returning soldier. Supervisors are instructed not to "hedge" with former employees who return from the service; merely to say; "When do you want to go to work." Where returning service men, not connected with the company, ask for work, they are advised to return to their old jobs, since any employment with San Diego Gas and Electric would be temporary.

After talking to officers about men who have advanced in the armed forces beyond their peacetime responsibilities, Cleland is convinced that most of the older men recognize that their rank is temporary and are interested in getting their old jobs back after the war. Some of the younger men, the officers say, have a different idea and want better jobs when they return.

In discussion, Cleland gave evidence that he has not forgotten the civilian who has remained with the company during the difficult war years, warning "don't forget the 84% not in the armed services; they have their rights, too."

As a G.I. prologue to the Los Angeles discussion, Lt. Charles Faulkner, Southern California Edison, told briefly of his experiences in a job which "you can't quit." The men, he said, are concerned about their right to earn a living and wonder if they will have to start all over or if they can go on from where they left off; wonder if they are being thought of as active members of the organization. They don't want charity, he stated emphatically, but reassuring words from a "boss" can boost morale while away, and interest and understanding can help the returning soldier through the adjustment period.

Rex Davis, manager of personnel, Southern California Gas Co., stressed the need of a definite policy for veteran re-employment to prevent a turn to bad leadership. Public utilities are more fortunately situated than some, he pointed out, because they will be selling the same basic commodity and will have to make fewer adjustments. Timing will be the difficulty, he believes, since "some men will beat the jobs back and some jobs will beat the men." Utilities should find jobs to take care of this interval, he thinks. While utilities should not have to do much laying off of personnel, a specific policy with regard to civilians also should be adopted, Davis advised.

Utilities are missing their best bet, he believes, if they do not get supervisors and other employees to write to service men. If this is done on company time, the effect on morale will justify the expense.

Importance of procedure for receiving the returned veteran was brought out by Davis, who feels that skills should be revaluated. "Good placements don't just happen," he declared.

"Don't let him wait while we dream up something he can do," he said in urging utilities to make a postwar organization chart now and thus help to eliminate false starts.

Advising management not to magnify the problem of the disabled veteran, Davis estimated that 85 to 90% will return without impairment of any kind. Jobs must be listed, however, that can be handled by the handicapped and job training must be geared to the handicapped. Management will have to work with medical departments on this, he feels.

Some soldiers will return dissatisfied with old jobs and job relationships and determined to "do the kicking around" if any is done, he pointed out. Some who were inducted from school will want jobs to match their maturity but will not have acquired technical skills. While it is imperative that these men be handled carefully, utilities have an obligation to their customers and must not upgrade to detriment of service, and certain labor rules must be observed, he warned.

John J. McGillvray, veterans' employment representative for southern California, WMC, stated that nothing less than the nation's complete resources is enough to dedicate to making the service man's difficult adjustment from military to civilian life. The veteran needs service, courteous treatment, placement on a job to use his highest skill, he declared. His usefulness depends upon the people around him, McGillvray said; the right job is helpful, the wrong one dangerous.

The U. S. Employment Service has had a veteran employment service for ten years, he explained, and it has been greatly expanded to take care of the needs of World War II, with 1,500 bureaus at USES offices, staffed by trained workers.

Employers must come to realize that a physical handicap is not necessarily a vocational handicap, McGillvray declared. The veteran bureaus receive medical histories of each man dismissed from service and, therefore, know what he can do physically.

Military personnel is now being discharged at the rate of 70,000 monthly, McGillvray pointed out. Many are being hospitalized.

In discussion at Los Angeles, the manufacturer's problem was declared greater than the utility's. One manufacturer stated that many will have more men in service at the end of the war than the total employed prior to war; that, in many instances, one or two have left from the same job. It was the consensus that, in these cases, employees hired since Pearl Harbor must be regarded as temporary.

#### Personnel Training

The electric industry has a high stake in the individual's training and along with all industry, is paying now for its lack of attention to the type of education youth receives in school and for several years after graduation. This was the contention of C. E. Cook, personnel manager H. S. Crocker Co., San Francisco, who spoke on new techniques in leadership. As new techniques develop, Cook sees fewer opportunities for untrained workers.

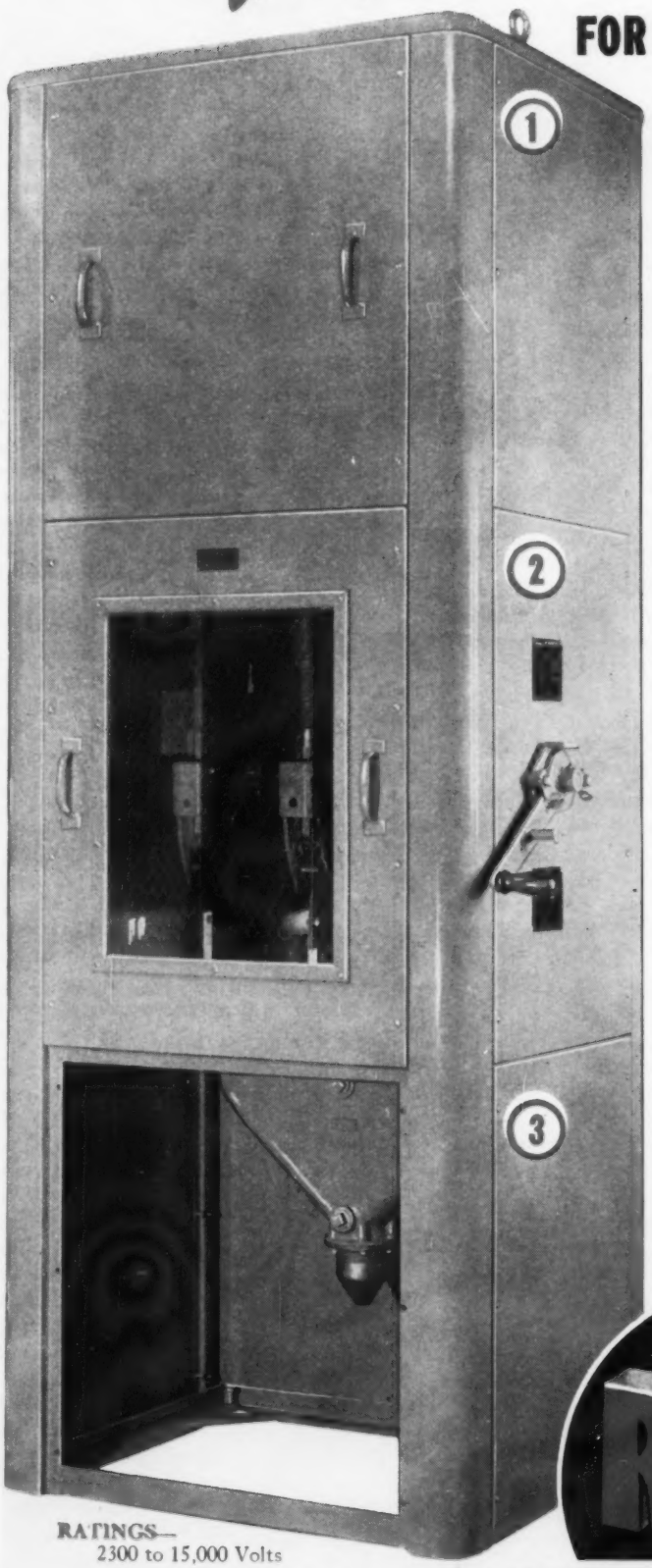
While he counseled cooperation between educators and business to correlate training activities and manpower needs, Cook stated that industry is going to have to train men, if it wants the job done. Management's job, as seen by Cook, is one of human engineering and, to meet its objective, it must train first-line supervisors clear up to top management to understand people and give them the things they want from their jobs. They want first of all recognition and credit for work done, Cook believes. In a recent survey, employers put fair pay and job security at the head of the list of job incentives; employees put job security eighth. Associations and contacts were high on the employee list, counting heavily with women.

C. B. Dwyer, of the War Manpower Commission, pointed out that, while the percentage of top management and supervisors in relation to workers has remained the same, with more people employed, it is necessary to train those who have been upgraded to supervisory positions. In outlining a training-within-industry course for supervisors, Dwyer advised management to let workers know how they are getting along; give credit when due; tell employees in advance about changes that will affect them; make best use of a worker's ability and try to put him on the job he likes best to do.

#### Customer Relations

F. U. Naylor, PG & E, led a symposium on wartime customer relations, at which opinions expressed at the recent Santa Barbara meeting of the joint electric and gas associations were reviewed, along with the experience of utility men attending the San Francisco meeting. Fact that the industry has been forced to re-examine its customer practices is believed to be a healthy thing, and it was declared possible that utilities might retain much of the wartime procedure, where it was efficient and effective. Consensus was that circumstances should govern.

# CHECK the FACTS

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*specify....*

**R & I E INTERRUPTER SWITCHES**

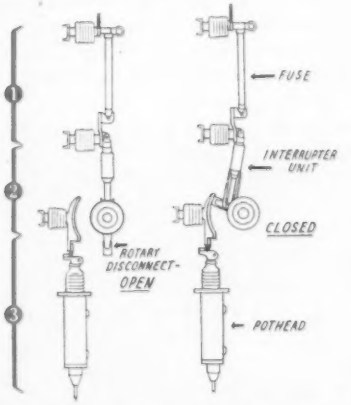
***with or without fuses for the primary side***

**APPLICATIONS—**

- In combination with fuses, to provide an economical means of fault protection and isolation for maintenance.
- To isolate transformer banks, instead of oil switches or expensive circuit breakers.
- For transfer or removal of load on energized distribution circuits.
- As a sectionalizing switch in feeder circuits.
- As an ordinary disconnect to provide safety in case of operating error.
- For interrupting exciting load currents of feeder regulators and capacitors.
- For changing transformer connections, star to delta or vice-versa without opening primary feeder.

**CONSTRUCTION—**

- Sturdy all-welded steel housings.
- All porcelain insulation.
- Floor, wall rack or transformer mounting.
- Available with conduit, through bushing, stud or pothead connections.




**Arcs quenched in interrupter unit chamber when current is interrupted — then rotary disconnect establishes open gap.**

**RATINGS—**
2300 to 15,000 Volts
200 and 400 Amperes

**R&IE**

## INTERRUPTER SWITCHES

**RAILWAY AND INDUSTRIAL ENGINEERING CO.**
GREENSBURG, PA. . . In Canada, Eastern Power Devices, Ltd., Toronto

## GARLAND-AFFOLTER ENGINEERING CORP.

*The Check List*

CONDUCTOR SUPPORTS CLAMPS AND FITTING

•

DISCONNECTING SWITCHES INDOOR AND OUTDOOR

•

AIR BREAK SWITCHES

✔

INTERRUPTER SWITCHES

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SWITCH OPERATING MECHANISMS

•

SUBSTATIONS

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OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSES

•

KIRK INTERLOCK SYSTEMS

•

AUTOMATIC SECTIONALIZING EQUIPMENT

•

METAL CUBICLES

•

TESTING DEVICES

SAN FRANCISCO
LOS ANGELES
SEATTLE
PORTLAND

# Northwest Utilization Heads Convene

## Spring meeting at Boise general staffs industry strategy, launches dealer field get-togethers

WITH an eye to the future, the sales managers and other representatives of Northwest utility companies, manufacturers and jobbers, laid some ground work for future sales policies at the semi-annual conference of the Utilization Section, Northwest Electric Light & Power Assn., at Boise, Idaho, May 11 and 12. As in the last such conference, December 1943, the discussions were set up for round-table treatment under the chairmanship of C. E. Hess, Puget Sound Power & Light Co. R. S. Overstreet, Idaho Power Co., handled the local arrangements for the 42 registered delegates.

C. J. Strike, President of Idaho Power Co., keynoted the meeting, stating that commercial department people constitute an important factor in re-establishing a sympathetic understanding by the public of the electrical industry and of individual companies. The public must be brought to understand, he said, that the utility industry is logically conceived and fairly and honestly conducted. Speaking for his own company he said that the cheapest load building we can get is through dealer organizations, but we may have to get into the merchandising business to pioneer new appliances and to plug gaps in the territory that may not be adequately covered by dealers. If we do get in, he said, it will be on a basis on which we have sufficient gross profit to cover the cost of doing a merchandising business and yielding profit on invested capital, the same as any mercantile concern.

Announcement of a series of meetings to be held the first two weeks in June to bring the future planning of manufacturers, distributors, and utilities to electrical dealers and contractors, was made by C. Patrick Johnson, Puget Sound Power & Light Co., chairman of the new electrical development committee, under whose auspices the meetings will be held. The ten meetings scheduled in this series will cover eight cities in western and central Washington and Lewiston, Idaho, and The Dalles, Ore. The idea is experimental, explained Johnson, and similar meetings may be scheduled later in the summer in other parts of the association territory. Preliminary indications are that the meetings will be well received by the dealers, who have been out of touch with their suppliers and who will welcome the opportunity to hear first hand some of the plans for a resumption of merchandising when merchandising is again possible.

The combination of agriculture and industry, brought together through scientific research by farm chemurgic councils, was cited as a productive outlet for cooperative work by utility companies, by Ralph E. Gale, Idaho Power Co. As a result of his company's interest in this work in Idaho, there will be produced this year 19,000,000 lb. of potato starch, worth three quarters of a million dollars. Each dollar of new wealth turns over five times, and the company gets 1½ to 2% per turn, according to Gale, so that this work pays back dividends as well as produces excellent public relations activities.

A survey among ten companies serving Utah, Idaho, Oregon, Washington and British Columbia, conducted by D. B. Leonard, Pacific Power & Light Co., showed that these companies expected to be serving 21,615 new farms and 96,650 new residences five years after the end of the war. This survey was part of the work of the section planning committee of which Leonard is chairman.

R. B. McElroy, the Washington Water Power Co., reporting on the operation of his company "trading post" for small appliances for the first five months, stated that 1,495 small appliances had been placed in service through bringing buyer and seller together, and that the average sales price was $5.77. Not only does this put the appliance back into service but, said McElroy, it has proven to be a wonderful good-will builder for the company, since no commission is charged on the sales.

An advertising campaign, sponsored by the four large member utility companies operating in Washington, is just being inaugurated according to A. H. Wegner, the Washington Water Power Co. A series of advertisements which will run in national magazines and newspapers in some of the larger eastern cities, under the title "Washington—the State—Has Everything," will bring out the advantages of the state in climate, raw materials, trained, adaptable and high quality labor, and abundant power. Some companies are creating new positions of director of industrial development or the equivalent of this title, and the suggestion was made that these men form a committee of the Utilization Section for the exchange of views on the possibilities of industrial development in their respective territories after the war.

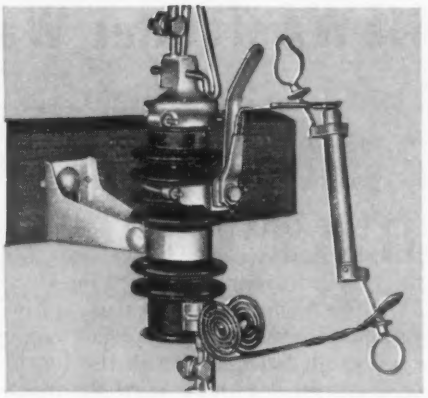
In the discussion of utility plans for load building after the war, the conference agreed with A. C. McMicken, Portland General Electric Co., that one of the first jobs would be rebuilding an adequate sales organization. C. T. Bakeman, Puget Sound Power & Light Co., presented the report of his company's postwar planning committee on dealers' sales development, discussing long-term financing of dealer sales, architects' cooperation as an aid to dealer sales, development of retail outlets for heavy-duty equipment, display and advertising aids to dealers, cooperation with manufacturers and distributors, utility home service department as an aid to dealers, sales education for dealer employees and kindred subjects.

This portion of the program reviewed the possibilities in the sales of new appliances such as quick-freeze units, new heating and air-conditioning equipment, automatic laundry, new lighting sources and many others. C. W. Wildebour, Puget Sound Power & Light Co., told of experimentation with a new DuPont silver-base paint, used as a heating element. This paint is a conductor and a one-inch-wide stripe, twelve feet long pulls about 400 watts. Painted on the inside of a brooder or other interior surface surrounding a space to be heated, it has definite possibilities, said Wildebour, though the details of its use for this purpose have not been fully worked out.

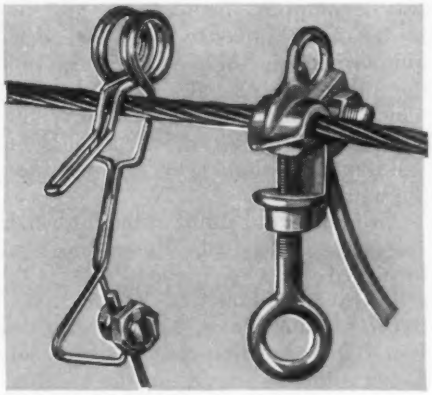
Manufacturers and jobbers were given an opportunity to tell what they could of their plans for after the war promotion. R. S. Belnap, General Electric Supply Corp., Boise; P. A. Maughan, Westinghouse Electric Supply Co., Salt Lake City; J. C. Platt, Edison General Electric Appliance Co., Seattle; L. R. Wilson, Lamp department, General Electric Co., Portland, were heard from. Fowler Manufacturing Co. announced by letter, read at the meeting, it would build a new factory in Portland for the manufacture of water heaters anticipating the need for increased manufacturing capacity after the war.

J. F. McAllister, Utah Power & Light Co., chairman of the committee on standardization, pointed out that the northwest companies are not far apart in their requirements for water heating and advocated accepting the standards developed by NEMA. The group passed

**FUSE LINKS**—individually wrapped, then packaged again in packets of five, arrive at the pole just the way they leave the Kearney factory.



**LIGHTNING STROKES** dissipated through low resistance path to ground. Power follow-up interrupted within the horn fibre fuse tubes.



**CLAMPS.** There is a Kearney Con-nec-tap clamp for the most unusual load or construction problem. Made in many types for all wire sizes.

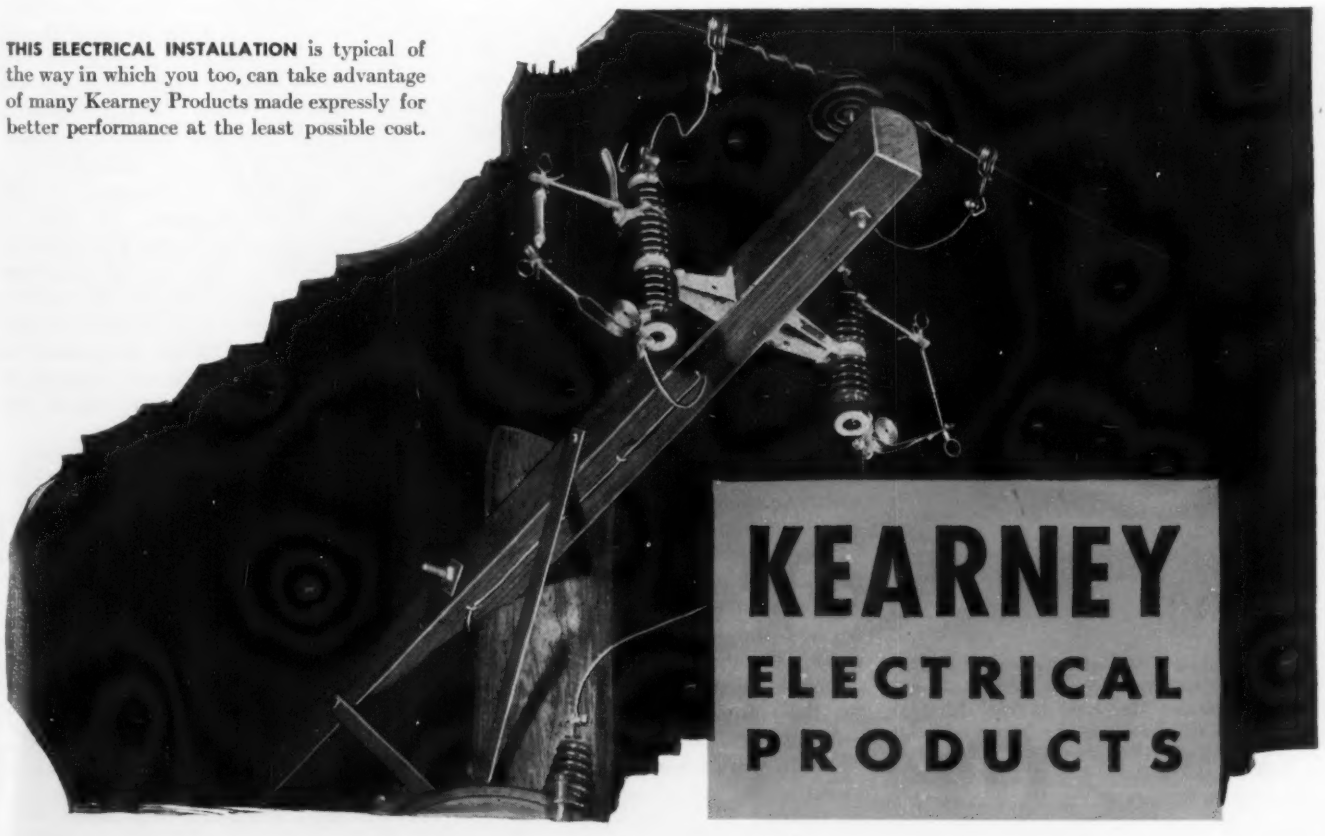
# RELATED CONSTRUCTION UNITS

One certain way of eliminating maintenance on any mechanical or electrical device is to replace worn or used parts after each operation. Sounds impractical but have you looked at the Kearney Trip-O-Link Fuse Switch? The porcelain in the insulator being an inert material is impervious to wear and tear. The hanger and fittings attachments made of carefully chosen materials, are in much the same category. Damage and wear caused by lightning, short-circuits and excessive loads are nearly always confined to the cartridge of a fuse switch. With the Trip-O-Link the ideal is closely approached because each re-fusing brings with it a fresh, full-dimensioned fibre-lined cartridge as an integral part of the fuse link. At the same time clean contacts are made because the bright new cable of the fuse links goes directly into the permanent switch contacts. In these days of revolutionary designs, take time out to investigate the Trip-O-Link. Please address your letter to Department "H,"

**JAMES R. KEARNEY CORPORATION,**
**4236 Clayton Ave., St. Louis 10, Missouri**

POSITIVE — LIGHT-WEIGHT — SAFE — LOW-COST

**THIS ELECTRICAL INSTALLATION** is typical of the way in which you too, can take advantage of many Kearney Products made expressly for better performance at the least possible cost.



**KEARNEY**
**ELECTRICAL**
**PRODUCTS**

two resolutions, one urging all elements of the industry to feature adequite wiring in their advertising, and the other urging sales control ordinances throughout the territory to eliminate the possibility of a flood of sub-standard appliances coming into the market.

An impromptu stunt, at the informal dinner put on by Idaho Power Co., was furnished by two Idaho Power Co. girls, Joyce Hubble and Veryle Lytle, Boise Minute Maids for the sale of War Bonds and Stamps. The girls on their routine selling job of the evening in the Boise Hotel, sold over $200 worth of bonds and stamps among the diners and made a lot of impromptu fun, which included Kangaroo Court wherein two recalcitrants were fined a $25 War Bond each, by "Judge" Joe Platt.

Harold E. Farris, Mountain States Power Co., was selected section vice-chairman for the coming year when A. H. Wegner takes over the chairmanship.

Because its name is not representative of the area from which its membership derives, the board of managers of the San Francisco Bay Cities Section recommended to the Illuminating Engineering Society that the name of the section be changed to Northern California Section and the matter was submitted to the members by ballot in connection with the voting for officers for the new year beginning in September. With members residing in Sacramento, Auburn, Stockton, Fresno and other northern California cities, it was felt that the name Northern California Section would more aptly describe the territory assigned to the section than one limited to the Bay region.

Maintenance of motors and control was the topic of discussion and information at the May 17 meeting of the Electrical Maintenance Engineers Association of Southern California, at Scully's, Julien H. Davis presiding. Westinghouse presented two sound films, *The Four Firsts of Motor Maintenance*, and *Ten Checks of Electrical Control Maintenance*. Ken Collins presented them with a brief talk. Following these a Westinghouse movie, *On the Air*, was presented, telling the history of radio broadcasting.

The future of residential lighting and some postwar implications were to be discussed at the June 7 meeting of the Illuminating Engineering Society, Southern California Section, Los Angeles, at Eaton's Chicken House. Frank Wagner, Wagner-Woodruff Co., was to lead the discussion with a talk on the subject. Harry Logan, Holophane Co., addressed the previous meeting in early May.

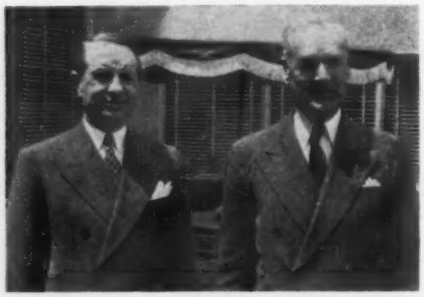
R. E. Johnson, district manager, aviation section of General Electric Co., Los Angeles, addressed the Los Angeles Electric Club, May 22, discussing the part electricity plays in the aviation industry. S. E. Gates, Los Angeles manager, G-E Co., was chairman of the day.

# NEWA Tackles War Made Difficulties

## Largest Pacific Division meeting is all business; renegotiation, war surpluses, manpower talked

RENEGOTIATION isn't funny, but H. A. Hanning, renegotiator for the price adjustment board of the U. S. Maritime Commission, formerly an investment banker and financial magazine editor, brought out all the fun to be found in it as he carried the meeting of the Pacific Division, National Electrical Wholesalers Assn. along with him through a complete renegotiation procedure at the war conference of the association in Santa Barbara, May 22-24.

It was the best attended meeting the Pacific Division NEWA has had in



W. J. Massey (left) general sales manager, Westinghouse lamp division, Bloomfield, N.J., and Walter Thompson, Pacific Coast mgr. lamp division

years, over 200 in all, 58 of whom were active wholesaler representatives from all over the West. Harry E. Perl, State Electric Supply Co., Oakland, chairman of the division, presided. Charles G. Pyle, managing director, NEWA, from New York attended and addressed one of the member meetings. Other Eastern notables included the two "expatriate" former Westerners, Al Nicoll, Graybar and Dave Salsbury, Westinghouse Supply.

R. W. Longstreth, regional manager, Office of Civilian Requirements, WPB, San Francisco, told the wholesalers what might be expected in respect to release of materials for consumer goods again. A former Frigidaire man, some years on the Pacific Coast, he spoke realistically of the unlikelihood of any such expectancy this year. As to disposal of government owned inventories of electrical materials he described the steps being taken to put these through orderly distribution channels in order not to create chaos in the industry. Industry advisory committees are working closely with WPB to work out controls for this disposal.

Without using his demonstration equipment at all, for which he is famous, Samuel G. Hibben, director of applied lighting for the lamp division, Westinghouse Electric & Mfg. Co., Bloomfield, told the wholesalers of their stake in the lighting market of the future. He outlined the position of the wholesaler in lighting equipment distribution and gave some hint as to the potential market.

The Tuesday general meeting was a question and answer type of meeting, none of the speakers giving formal papers. Wednesday's meeting was devoted to postwar planning and to a war program. Clyde Houston, vice-president, Southern California Edison Co., headed a customary program in which utility leaders outlined their future plans. R. E. Fisher, vice-president, Pacific Gas and Electric Co., San Francisco; E. E. Royer, vice-president and general manager, Washington Water Power Co., Spokane; and James Polhemus, president, Portland General Electric Co., Portland, each discussed his company and territory plans.

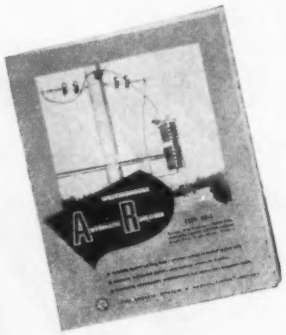
Capt. David E. Ring, Ninth Service Command, San Francisco, headed a program in which army and navy speakers brought the war close at hand. Presentation of the colors by a color guard from Hoff General Hospital, Santa Barbara; a talk by Lt. Swartz, USN, and Chief Warrant Officer O'Brien, who related incidents from two years' experience in a submarine; two recently released war films concluded this feature of the Santa Barbara program.

Phil Carson, Graybar Electric Co., San Francisco, was elected chairman of the Pacific Division and Harry Perl, retiring chairman named national delegate on the executive committee of NEWA. R. A. Balzari continues as secretary of the division. There was no golf tournament this year.

San Diego County Chapter of National Electrical Contractors' Assn. holds a regular round-table meeting the last Monday of each month, according to W. T. Heinz, secretary. The labor problem in San Diego County has been discussed at the last meeting. The problem in San Diego County has revolved around inequities in wage scale for electricians among the government agencies and the contractors. A ruling of the War Labor Board has recently been given to clarify and alleviate a situation which at one time threatened to reach a strike stage.

### GET THIS BULLETIN

This bulletin—B-3329—presents complete application data on the new AR-1 Reclosers. It describes how to co-ordinate them with other protective devices, gives features, dimensions, methods of mounting and ordering information. Ask your nearest Westinghouse distributor for a copy today. Or, write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.



Your Westinghouse distributor offers two ready answers to circuit protection problems on extended distribution lines.

*First:* Westinghouse Type AR-1 Reclosers which give maximum protection with minimum outages on long rural systems.

*Second:* The distributor's own "how-to-do-it" ability . . . based on his own and Westinghouse experience in similar applications.

On temporary faults, the AR-1 Recloser *opens, recloses* and *resets itself.* It is then ready for operation over the same cycle. If the line fails to clear, the recloser attempts to re-energize the line three times and then locks out. Ample time delay on tripping permits co-ordination with other reclosers and standard fuses to reduce line outages to an absolute minimum.

The AR-1 Reclosers eliminate inspection and service trips on transient faults, avoid revenue loss on unnecessarily dead lines, improve suburban rural line service, build customer good will. Ask your Westinghouse distributor about them today J-90510

## TRIED THESE ANSWERS TO UNNECESSARY OUTAGES?

TAP THE "HOW-TO-DO-IT" ABILITY OF YOUR WESTINGHOUSE DISTRIBUTOR

SEE YOUR WESTINGHOUSE DISTRIBUTOR *FIRST!*

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MORE proof that private initiative can do the job, this great new $25,000,000 hydro-electric project was financed in the traditional way of American business—without expense to the taxpayer!

When the war is over and the nation comes face to face with the biggest I.O.U. in history, PIT 5 will be found on the right side—PAYING taxes—creating new wealth and employment—supplying more than 214,000 electrical horsepower at one of the lowest rates in the United States.

Every believer in Free Enterprise can take pride in PIT 5 for it is not only California's largest hydroelectric plant, but a splendid example of sound, economic planning and investment.

Large in terms of marketable output, the last word in engineering design and equipment, ideally inter-connected with 64 other P.G. and E. plants to insure maximum utilization—PIT 5 represents the kind of Value which is the only real basis for low rates.

Today, running at full load, PIT 5 is sending 214,477 horsepower surging down the main line of power from Shasta County to thousands of war-busy factories, farms and homes.

After the war this great plant will help California to grow industrially and to employ our vast new manpower.

# PIT 5 POWERHOUSE

**COMMISSIONED: APRIL 29, 1944 • COST: $25,000,000 • CAPACITY: 214,477 HORSEPOWER**

*65th in a chain of powerhouses supplying an entire region efficiently and economically*

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

# NEWS of the industry

## PLAN CHANGEOVER FOR BOISE GAS CUSTOMERS

Plan of the Boise Gas Light and Coke Co. serving 1,700 customers in Boise, Idaho, to discontinue service and turn its business over to the Idaho Power Co., was heard before the Idaho Public Utilities Commission on May 25. Under the plan agreed upon between officers of both the gas and the electric companies, present users would be permitted to convert to electric service without cost, or secure bottled gas service if flame type heat is required for certain commercial and industrial users.

"The action taken," said C. J. Strike, power company president, "is in the public interest because it precedes serious difficulties in the rendering of gas service to these customers. The gas company is not in financial difficulties, but its officers foresee the problems of continuing with earnings insufficient to provide for replacement and maintenance.

"The plan advanced enables a satisfactory settlement to bondholders, provides for conversion to electric service without cost, and is a sound transaction from the standpoint of the Idaho Power Co."

If approved by the commission, the changeover to electric service will depend upon securing priorities for materials, equipment and appliances. The power company will endeavor to offer each gas customer electric appliances of approximately the equivalent type and capacity as those now used. These will be installed and wired without cost.

## Lengthy FPC Hearing Ends In Montana

A seven-week long Federal Power Commission "write-off" hearing involving the capital structure and accounts of the Montana Power Co. closed in Butte recently with the announcement that main briefs in the hearing would be filed by the company, intervenors and the Montana Public Service Commission staff by August 1, with reply briefs due Sept. 15.

Record of the hearing conducted by the Montana Public Service Commission jointly with FPC Trial Examiner Edward B. Marsh will be considered with briefs by the examiner and the FPC for subsequent ruling.

The hearing was on an order to show cause why the power company should not adopt the FPC staff report under the commission's uniform system of accounts and write off about $50,000,000 from the company's books.

A total of 420 exhibits was introduced during the lengthy hearing and transcript of the action was expected to total about 5,800 pages.

## Mountain States Power Acquires New Properties

Properties of the Mill City Light and Water Co. on the Santiam river, Oregon, were acquired recently by Mountain States Power Co., for a cash consideration of $75,000. The company operates in Oregon, Washington, Idaho, Montana and Wyoming.

The sale involves the Santiam River hydro plant of Mill City Light which supplies electric energy to 368 customers and water to 255 users. Mountain States Power, which is headquartered at Albany, Ore., will continue to operate the plant at full capacity and connect the two systems with six miles of transmission line, transferring surplus power to other communities.

Through an order of the Oregon Public Utilities Commission, present customers of Mill City Light will have the benefit of lowest rates listed by either company at time of sale.

## CHAMBER SURVEY SHOWS POSTWAR OPPORTUNITIES

Prewar consumption of electrical products in the eleven Western states lagged far behind production in that area, and this lack of balance indicates broad opportunities for new industrial output in the postwar West, according to a study just completed by the industrial department of the Los Angeles Chamber of Commerce.

Using the principal product classifications shown in the U. S. Census of Manufacturers, the study showed that in 12 of the 13 industries consumption averaged five times the production on the basis of 1939 figures. This situation existed despite the fact that the West, in proportion to its population, was the greatest buyer of electrical products in the U. S.

Postwar opportunities were demonstrated by figures which indicate that in 1939 the eleven Western states accounted for 10.9% of wholesale electrical purchases while Western production of electrical goods was only 2% of the national total. Relative production of various classes of equipment is shown in the accompanying table.

The survey indicated that postwar demand will be further expanded by the large influx of population attracted to this area during the war years. It also pointed out that export possibilities to countries bordering the Pacific are large.

**Fields Offering Greatest Opportunities for Postwar Expansion of Western Electrical Goods Production as Indicated by Prewar Positions in Relation to U. S. Output**

| INDUSTRY | 1939 VALUE OF PRODUCTION United States | Los Angeles Industrial Area | Eleven Western States | 1939 Production Value, Eleven Western States as Per Cent of U.S. |
|---|---|---|---|---|
| Automotive Electrical Equipment | $109,762,000 | $ * | $ * | * |
| Batteries, Storage and Primary (Dry and Wet) | 117,583,000 | 3,887,000 | 6,012,000 | 5.1 |
| Carbon Products | 18,376,000 | None | * | * |
| Communication Equipment | 191,326,000 | 527,000 | 718,000 | 0.4 |
| Electrical Appliances | 145,696,000 | * | 3,747,000 | 2.6 |
| Electrical Measuring Instruments | 41,797,000 | * | 111,000 | 0.3 |
| Electrical Products, Miscellaneous | 39,049,000 | 203,000 | 203,000* | 0.5* |
| Electric Lamps | 84,828,000 | None | * | * |
| Generating, Distribution, Industrial Apparatus | 470,462,000 | 6,113,000 | 13,955,000 | 3.0 |
| Radios, Radio Tubes and Phonographs | 275,870,000 | 5,080,000 | 5,616,000 | 2.0 |
| Wiring Devices and Supplies | 94,305,000 | * | 1,530,000 | 1.6 |
| X-ray, Therapeutic Apparatus, Electronic Tubes | 17,945,000 | 939,000 | 939,000 | 5.2 |

* Represents incomplete reporting due to some production so small that data were withheld to prevent disclosure of individual operations, or percentage so small as to be of no statistical significance.

# VICTIMS OF A "MECHANICAL BRAIN"

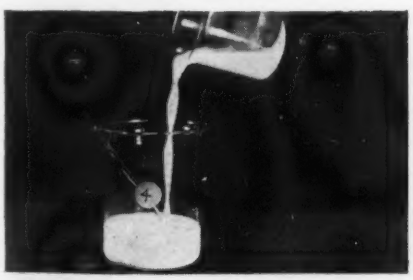
Zeros knocked out of the sky at the rate of one to every 90 rounds of ammunition fired! That's the feat our anti-aircraft batteries are performing in the South Pacific. During World War I, the average was but one plane to every 17,000 rounds.

Credit is due largely to the new M9 gun director—a "mechanical brain" that aims a battery of four 90mm. guns and sets their fuses. Everything is done mathematically by electricity.

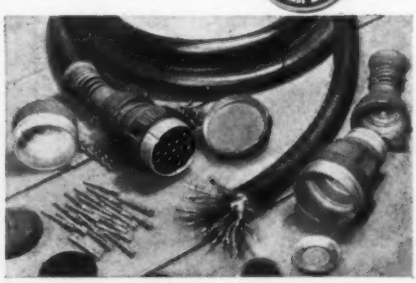
The delicate synchronization of tracker, height finder, computer, power rectifier and altitude converter depends on scientific perfection of the electrical cable.

Laytex Portable Cable, developed by U.S. Rubber Company engineers, is used throughout. It transmits the data for lightning-fast calculation without chance of human error, resulting in fire control of deadly accuracy. Results attest how exactly this cable meets this specialized need.

**Laytex** REG. U. S. PAT. OFF. **WIRES AND CABLES** **US** **SERVING THROUGH SCIENCE**



**PURIFIED LIQUID LATEX** is used for Laytex Wire and Cable Insulation. A special process removes moisture and water-soluble impurities. Laytex insulation—whether made from either natural or synthetic rubber—has exceptional dielectric strength.



**CABLE AND PLUG ASSEMBLY** for the M9 gun director. Laytex Insulation developed by U.S. Rubber Company engineers is built up into a homogeneous unit around the perfectly centered wires by an exclusive process of repeated dipping and drying, followed by vulcanization.

**TOMORROW'S PROMISE** — Although the entire output is still going to meet critical war needs, a day will inevitably arrive when we shall again supply U. S. Laytex Wires and Cables for Buildings, Police and Fire Alarms, Communications, Signalling, Power and Control.

*Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T Carl Van Doren and a guest star present an interlude of historical significance.*

## UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

THESE Transformers are *completely manufactured*—not just assembled—under direct supervision of Thermador engineers who strive for better Transformers by constant improvement and perfection *of each component part*—insuring a higher standard of quality.

Thermador's *exclusive* THERMATITE TREATMENT renders these Transformers immune to extreme temperatures—arid or moist, hot or cold—with an efficiency *unsurpassed.*

Thermador Electrical Manufacturing Company, 5119 S. Riverside Drive, Los Angeles 22, California.

**THERMADOR TRANSFORMERS**

THERMATITE TREATED

DEFEAT HEAT • COLD • HUMIDITY


## IDAHO POWER PURCHASES WEST COAST PROPERTIES

Electric properties of the West Coast Power Co. in Idaho, serving 15 communities in the southern and western parts of the state, have been purchased by Idaho Power Co., it was announced recently by C. J. Strike, president and general manager of Idaho Power.

Actual transfer of the company's properties will take place about July 1 when Idaho Power's uniform rates will be established in the new territory, resulting in substantial savings to present customers of West Coast.

Part of the territory involved in the acquisition is now interconnected and served at wholesale from the Idaho Power Co. system, Strike pointed out.

At the same time Strike announced completion of negotiations providing for the refunding of the outstanding $6,058,700 of Idaho Power 7% and $6 preferred stocks by the issuance of a new 4% preferred stock series in like amount. The plan, which is subject to stockholders' approval at a special meeting called for June 23 and to approval of regulatory authorities, will result in annual savings to the company of about $129,000.

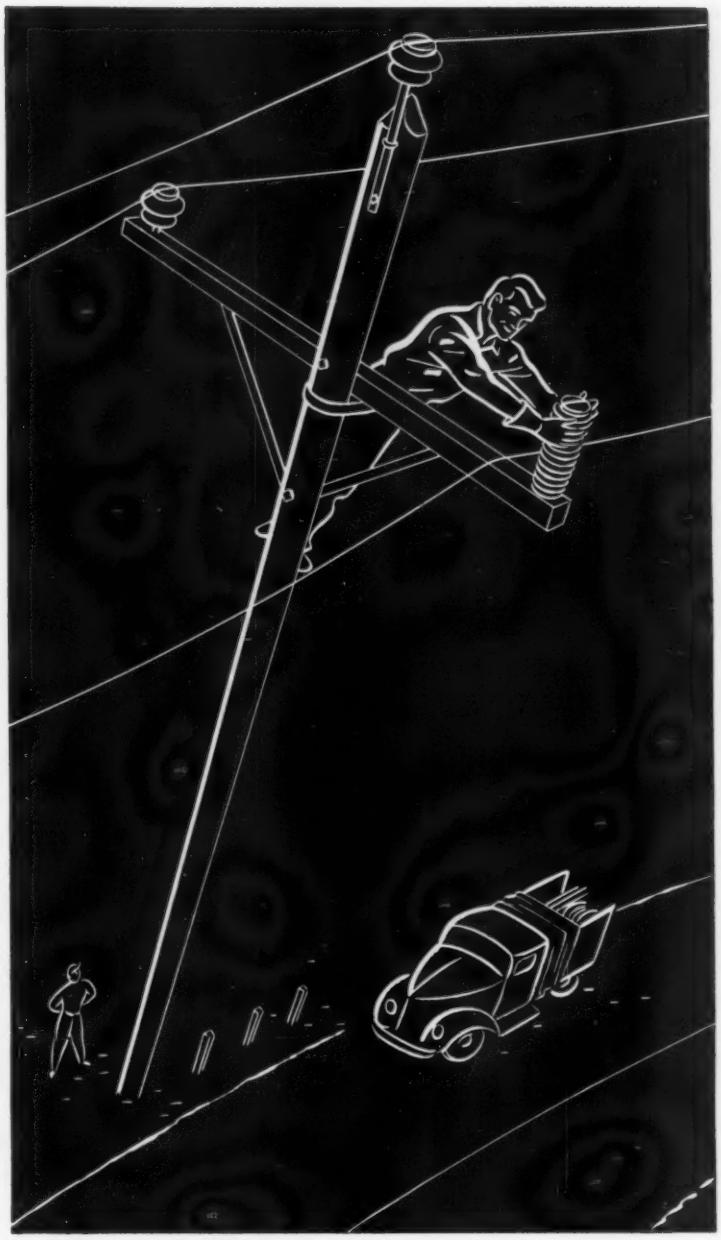
Assuming the successful consummation of preferred stock refunding, the company proposes a reduction in electric rates, effective Sept. 1, 1944. During the past ten years, Idaho Power has voluntarily reduced its rates ten times, the calculated cumulative effect of these reductions exceeding $1,000,000 per year.

## High Court Will Review Holding Company Case

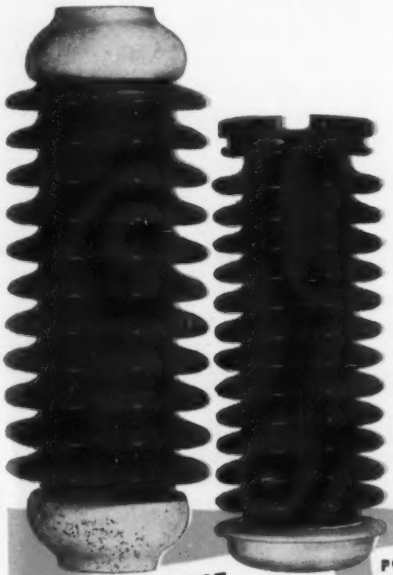
The U. S. Supreme Court has agreed to review a circuit court of appeals decision upholding an SEC decision that the Pacific Gas and Electric Co. is a subsidiary of the North American Co. SEC had refused an application from PG and E requesting that it be declared free from the holding company provisions of the law.

At the time of passage of the Holding Company Act of 1935, North American held 17.7% of PG and E voting stock. The law gave the SEC discretionary authority to declare any company as subsidiary of another if more than a 10% voting stock ownership was involved. Such a declaration would make the subsidiary organization subject to SEC regulation. PG and E was brought under the provisions of the law by an SEC ruling and has been contesting this action in the courts ever since.

# HOW MANY MAN-HOURS PER-MILE-PER-YEAR FOR MAINTENANCE OF YOUR TRANSMISSION LINES ?



**In dollars-and-cents, transmission line patrol and maintenance is an important item in normal times. In wartime, man-hours on this job are even more critical. A line on Lapp Line Posts is a year-in-and-year-out economy on either count. Power arcover, stones or bullets, even severe enough to rip a couple of petticoats off, leaves these rugged posts with ample security to do their job. Fog-type design eliminates need for cleaning. Puncture and cracking are unknown in these units. The records on hundreds of installations, in notoriously tough areas, show that it's safe to eliminate most patrol cruises, and that insulators maintenance of all kinds is only a fraction of that on conventional high-voltage insulators.**



**LAPP LINE POST and STATION POSTS on your system offer . .**

**POWER ARCOVER.** *Flashover and leakage distances are not appreciably lowered by damage —even loss of several petticoats.*

**NO PUNCTURE.** *Puncture path in Lapp Post design is as great as flashover path. Insulator will flash over rather than puncture.*

**NO CRACKING.** *One piece post body, not subject to bursting from tension strains created by thermal changes in nested parts.*

**RADIO INTERFERENCE.** *By virtue of design factors alone, radio interference is permanently prevented at rated neutral voltage.*

**NO CLEANING.** *Fog-type design preserves uniform leakage path, prevents leakage flashover, makes the unit "self-cleaning."*

**MECHANICAL RUGGEDNESS.** *Stones or bullets deflect off, or rupture petticoats, leaving post body intact and insulator secure.*

# Lapp

**LAPP INSULATOR COMPANY, INC., LE ROY, N. Y.**

Yes, They Grip HARD

Sure, They Grip WITH MAXIMUM CONTACT BETWEEN CONDUCTORS

You Bet, They Grip WITH THE FAMOUS SHELDON U-SNUB GRIP THAT CANNOT PULL OUT

But Never Forget that THEY GRIP PERMANENTLY

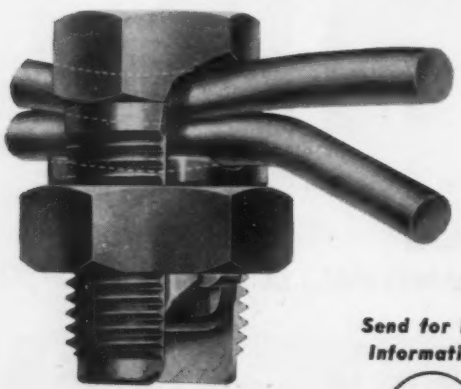
Because of Highest Frictional Efficiency

SHELDON SPLITBOLT

MAXIMUM-FRICTIONAL-EFFICIENCY SNUB-GRIP CONNECTORS

DIAMOND-HARD FRICTIONAL EFFICIENCY: The principle of low frictional coetticiency tor threaded wire connectors was discovered by engineers of the Sheldon Service Corporation. The more of the tightening effort that goes into clamping the conductors together, the tighter the wires are gripped.

Maximum frictional efficiency is achieved only when the material possesses a diamond-hard surface. Softer surfaces resist the tightening torque. For example, an automobile drives more efficiently over a highway with a smooth, hard surface than over one covered with rocks and debris. Similarly, soft-surfaced materials impede the efficiency of the split-bolt. Sheldon gripping pressures are the highest found in any split-bolt connector.



SHELDON Service Corporation
Long Island City, N. Y.

Send for Full Information

Makers of: SPLIT-BOLT and NO-BOLT Connectors; Limiters; Crab-Joints; Kompress Hydraulic Press Auxiliary Connection Blocks

"You're Well Connected with SHELDON"

Sales Agents: We now have some excellent open territories.

## NORTHWEST MYSTERY LOAD DISCUSSED IN CONGRESS

The Northwest's vast "mystery load," the nature of which is unknown even to the men who supply the power, was discussed publicly for the first time on the floor of the House last week by Rep. Homer D. Angell, Oregon Republican, who estimated that "it will consume more power than presently used in the environs of Portland, representing a population of around half a million."

Angell said he could say "with propriety" that the load "represents a new weapon of warfare, developed by new manufacturing processes, that will turn large volumes of electricity into the most important projectile yet developed."

Angell told the House to beware of cutting appropriations for the Bonneville Power Administration, which serves the load, lest the manufacture of the new weapon be endangered.

## USBR Files Program For Missouri River Project

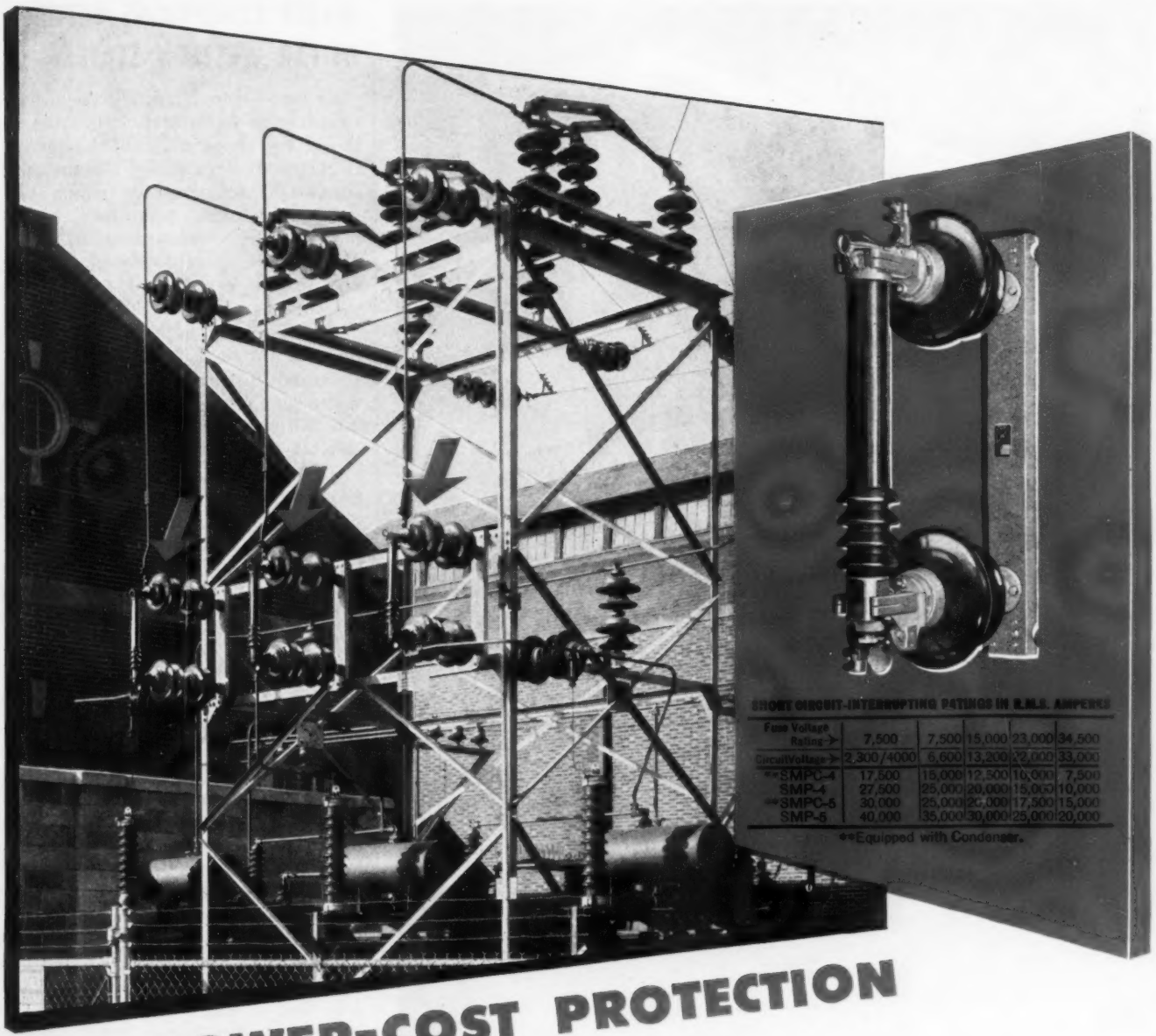
Development of 758,000 kw. of power capacity and almost 4 billion kwh. annually is proposed in a USBR program for utilizing the water resources of the upper Missouri River in combined power and irrigation projects involving Montana, Wyoming, Colorado, North and South Dakota, Nebraska and Kansas.

In a report filed with Congress the USBR has outlined a development program estimated to cost $1,257,645,700. It includes 17 power plants with six totaling 238,500 kw. located in Montana, eight totaling 195,000 kw. in Wyoming and three totaling 325,000 kw. in South Dakota. Also proposed is a transmission grid linking the plants together and connecting them with existing facilities and markets.

## Cavein Delays Work On Nisqually Project

A cavein in a 6,500 foot tunnel being bored between La Grande dam and its power house on the second Nisqually project at Tacoma, Wash., has occasioned further postponement of time power will flow from the 40,000-kw. generator. Electric energy was expected to be generated last Oct. 15, but progress in the same tunnel was halted last March when a sand pocket was encountered.

The project is 87 per cent complete and over $17,000,000 has been spent to date.



SHORT CIRCUIT-INTERRUPTING RATINGS IN R.M.S. AMPERES

| Fuse Voltage Rating → | 7,500 | 7,500 | 15,000 | 23,000 | 34,500 |
|---|---|---|---|---|---|
| Circuit Voltage → | 2,300/4000 | 6,600 | 13,200 | 22,000 | 33,000 |
| **SMPC-4 | 17,500 | 15,000 | 12,500 | 10,000 | 7,500 |
| SMP-4 | 27,500 | 25,000 | 20,000 | 15,000 | 10,000 |
| **SMPC-5 | 30,000 | 25,000 | 20,000 | 17,500 | 15,000 |
| SMP-5 | 40,000 | 35,000 | 30,000 | 25,000 | 20,000 |

**Equipped with Condenser.

# THIS LOWER-COST PROTECTION

***Saves Space, Weight, Structural and Other Critical Materials . . . and is Low in Maintenance Costs***

More and more substations are going to this type of protection—specifying S&C type "SM" Power Fuses for their known dependability, uniform accuracy in time-current characteristics and high interrupting capacity. They are rated to 33KV in capacities from 1 to 400 amperes, and are available for indoor or outdoor service.

Bulletin 200E gives complete data. It will pay you to send for it.

**SCHWEITZER & CONRAD, INC.**
**4435 Ravenswood Avenue, Chicago 40, U. S. A.**
***Supplied in Canada through Powerlite Devices, Ltd., Toronto***

WESTERN REPRESENTATIVES:

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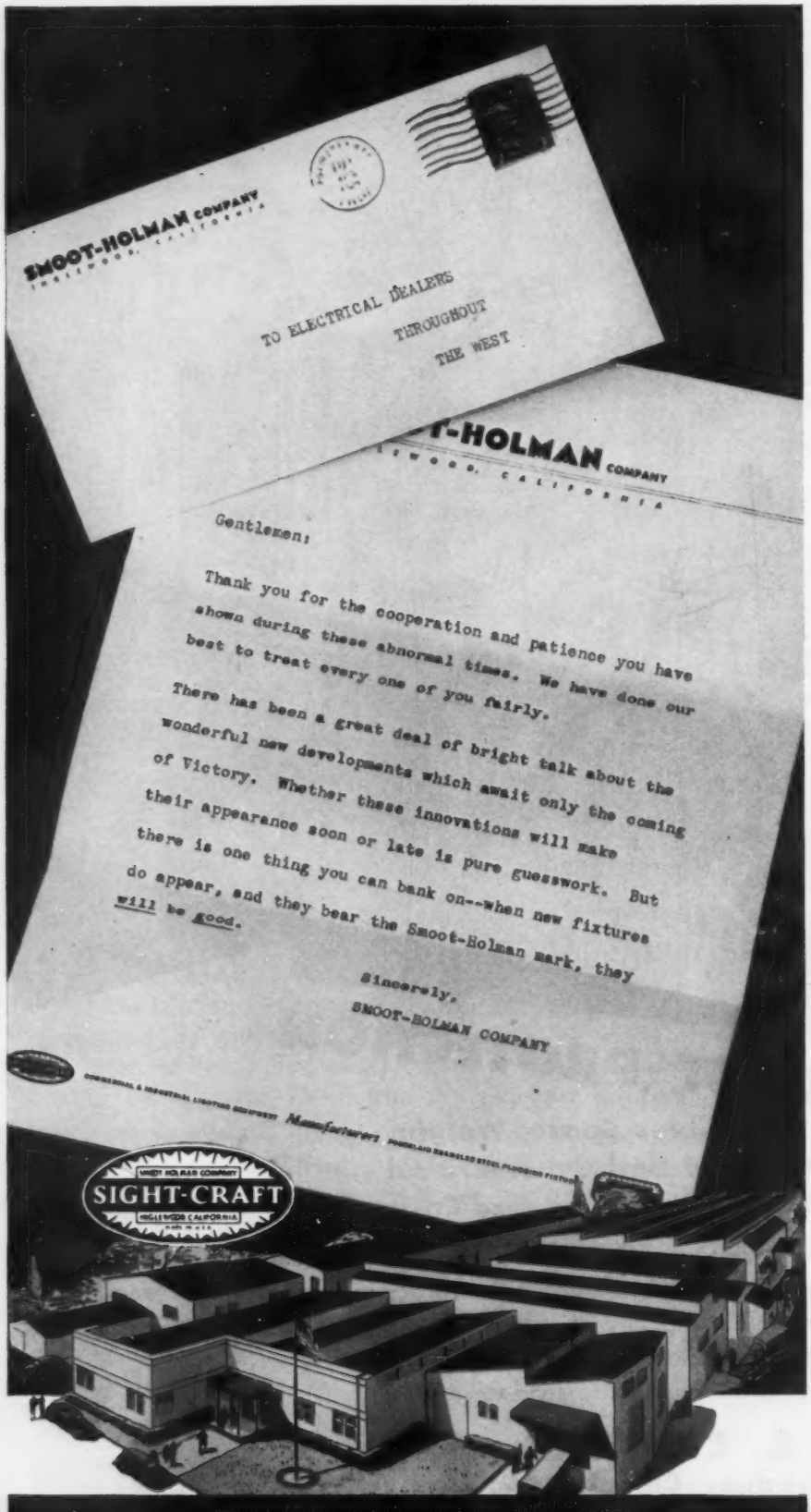
**TYPE "SM" POWER FUSES**
EXPERIENCE CHOOSES S&C FUSES


SMOOT-HOLMAN COMPANY
INGLEWOOD, CALIFORNIA
TO ELECTRICAL DEALERS
THROUGHOUT
THE WEST
Gentlemen:
Thank you for the cooperation and patience you have shown during these abnormal times. We have done our best to treat every one of you fairly.
There has been a great deal of bright talk about the wonderful new developments which await only the coming of Victory. Whether these innovations will make their appearance soon or late is pure guesswork. But there is one thing you can bank on--when new fixtures do appear, and they bear the Smoot-Holman mark, they will be good.
Sincerely,
SMOOT-HOLMAN COMPANY
SIGHT-CRAFT
SMOOT-HOLMAN
COMPANY
INGLEWOOD, CALIFORNIA
Offices in Principal Western Cities — Branch Warehouse in San Francisco

## WATER CONDITIONS BETTER IN FAR WESTERN STATES

Critical water conditions reported a month ago have been somewhat relieved by above normal precipitation in many Western states, together with subnormal temperatures which have delayed runoffs, according to the monthly USGS water resources review. The outlook is generally more favorable than in early April, according to the survey.

Acute conditions still exist in portions of Montana, in southeastern Arizona and in British Columbia. Ground water supplies in the West are also below normal due principally to unseasonable pumping demands.

The final California cooperative snow survey showed May 1 snowpacks almost equal to those of a month earlier due to delayed runoff. Anticipated flow from snowpacks was below normal for most watersheds with the deficiency increasing from south to north.

## Edison Expects 73 Per Cent Runoff at Big Creek

Runoff in the Southern California Edison Co.'s Big Creek hydroelectric project in central California where, under ordinary circumstances, about half of the company's power is generated, is expected to be about 73% of normal this year.

For the runoff period that began about April 1 and will end around July 31, it is anticipated that about 332,000 acre feet of water will be received in Florence, Huntington and Shaver lakes, reservoirs for the project, as compared to 455,000 acre feet which 22 years of record has shown to be about average.

In anticipation of this situation, arrangements were made to carry over more water than usual at Big Creek.

More power will be generated at Edison's Long Beach steam station to make up for this slightly below average runoff at Big Creek.

On April 1 the Edison Company had around 56,900 acre feet of water in Shaver, Huntington and Florence lakes. By July 31, the expected 332,000 acre feet of runoff will bring the season's total water resources there to around 388,900 acre feet.

Subtracted must be an estimated 27,900 acre feet of unavoidable spill at Mono-Bear dam, 6,400 acre feet of estimated evaporation, and 110,000 acre feet of estimated use, leaving around 245,000 acre feet available for storage. The capacity of the lakes is 288,500 acre feet.

# INVASION *and the* FINAL CHALLENGE

The idea that our national security some day would depend upon the successful invasion of continental Europe by our armed forces was inconceivable to the average American but a few short years ago. Yet, today our whole strength is assembled to that very action and for assuring a sound and permanent peace.

America became great without aggression . . . without tyranny. Our greatness has been achieved without destroying others . . . ours is a history of unprecedented industrial progress, of development of our own resources and reliance on our own efforts.

Aggression is foreign to American philosophy. Yet, today we find ourselves faced with the choice of destroying or being destroyed. Today we are confronted by the hard fact that the kind of peace which we all so fervently desire can be achieved only by crushing autocracy and by removing the causes of aggression.

We are now engaged in the accomplishment of the first objective. Since Pearl Harbor a complacent, peace-loving America—the largest of the "soft" and "decadent" democracies—has grown strong and tough. Out of the inherent virility of a free people we have moulded the mightiest force for invasion and attack that the world has ever seen.

We have reached our peak rates of war production. We are producing as much war equipment as all the rest of the world combined.

History will record our industrial mobilization as a phenomenal achievement.

The battle of production has been won!

The full might of our armed forces and those of our allies unleashed against the Axis war machine will bring eventual victory. Two and a half years of intensive preparation, backed by 168 years of growth as a free nation, has given us superiority over twenty years of painstaking preparation by the totalitarian and militaristic countries with their enslaved peoples.

Every American has contributed toward this powerful offensive. Our manufacturers and business leaders have exerted their fullest efforts. Our industries have mobilized their tremendous resources—tapped to the fullest degree their inventive and productive genius. The men and women in the factories, on the farms, and in the mills and mines have played a magnificent

part in the tremendous production program. Citizens all are making their contribution to the armed victory that lies ahead

We have demonstrated that a free people under a free enterprise economy can unite in a common purpose.

* * *

When the war is won, we shall be faced by our second objective . . . removing the causes of aggression. This is a social challenge. A challenge to those who would sacrifice our democratic way of life for personal gains or foreign ideologies.

The best insurance for the continuance of our democracy is a successful democracy. That means a dynamic and not a static democracy. All of us who want to preserve the ideals that have made America . . . and that includes all but a handful of extremists . . . must determine to find the policies and programs which will permit us to make the most of the abundance nature has provided for us.

To achieve this end we must recognize the fact that we are but a wheel in the machinery of world economy. A wheel that must drive or be driven. A wheel that must mesh smoothly with the many other wheels or be stripped of its cogs.

We are the only nation on earth free enough and strong enough to shape the mould of its own destiny. We can be hampered by nothing but our own confusion.

* * *

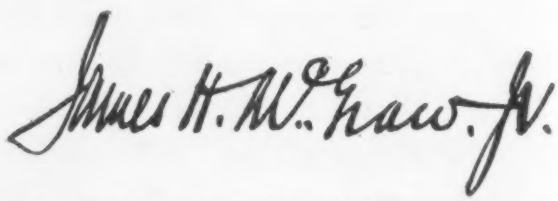
The mind and the heart of all America today brood over the shores of Britain and watch over the narrow waters that wash the beaches of the Continent. And the prayers of all America go with each of those who embark upon that epic passage.

Those of us at home who are producing the fighting tools and who are so earnestly concerned with the problems that will face a postwar America, should see now, even if we may never have seen it before, that all our plans will be worth just exactly what the men and women who make that passage are prepared, competent, and inspired by their leadership to make them worth.

For those men and women are America!

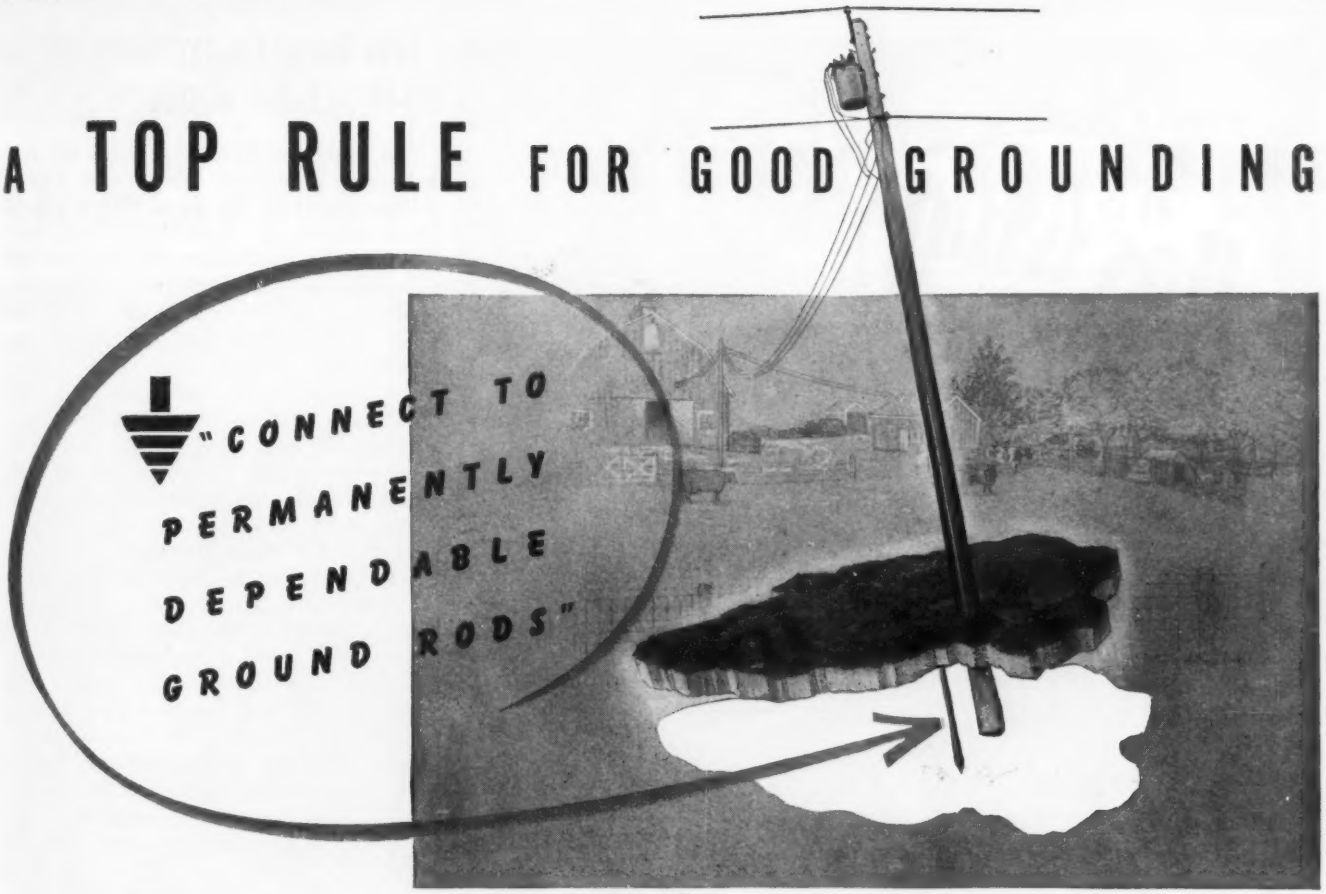
They have gone out from rich homes and poor homes alike, from farms and factories, from schools and churches, from mines and ranches, from offices and studios, to take their places in the battle line. They are a cross-section of the America that is to be.

Whoever may draw the plans for that America, it is those men and women who will make the plans good. Invasion is their first step toward that end. May their work be speedily done, and may our plans be worthy of that work.



*President, McGraw-Hill Publishing Company, Inc.*

# A TOP RULE FOR GOOD GROUNDING



If ground rods were uprooted, you would see the tens of thousands of Copperweld ground rods giving dependable service today. The stiff steel core that makes driving easy is protected from rusting by a thick exterior of copper. And when a copper ground wire is clamped to a Copperweld ground rod, there are no dissimilar metals in contact—the connection is "copper-to-copper."

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PERMANENTLY DEPENDABLE

## GROUND RODS

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*Pacific Coast Representative:* C. E. INGALLS · RIALTO BUILDING · SAN FRANCISCO, CALIFORNIA

STRENGTH to support the pole structure under maximum ice and wind loading... RUGGEDNESS to withstand the punishment incurred in construction and service.. DURABILITY that provides a minimum of maintenance . . . all these are combined —with important ECONOMY— in *Crapo* Galvanized Steel Strand.

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**INDIANA STEEL & WIRE COMPANY..... MUNCIE, INDIANA**

**Crapo GALVANIZED STEEL STRAND**

## LOS ANGELES SYSTEM HAS $88,383,000 BUDGET

A budget of $88,383,000 for the Los Angeles municipal Water and Power Department for the fiscal year 1944-45 was passed by Board of Water and Power Commissioners recently, though Commission President James B. Agnew voted against it, protesting "costs are out of control and this budget calls for more than is taken in."

Included in the budget is provision for wage increases, granted by a majority board action, which settled a February strike between the department and its employees under leadership of the AFL International Brotherhood of Electrical Workers.

Legality of the $10-a-month wage increase is still a question facing the commissioners, who were told in April by an appointed investigating committee they had violated a whole string of federal, city and board rules. Asking for an opinion from the city legal department, the commissioners found that "as a matter of law the federal requirements concerning wage and salary stabilization are not applicable to the department." However, it was pointed out the department could voluntarily conform to procedure set up by federal authorities that administer the program to private employers.

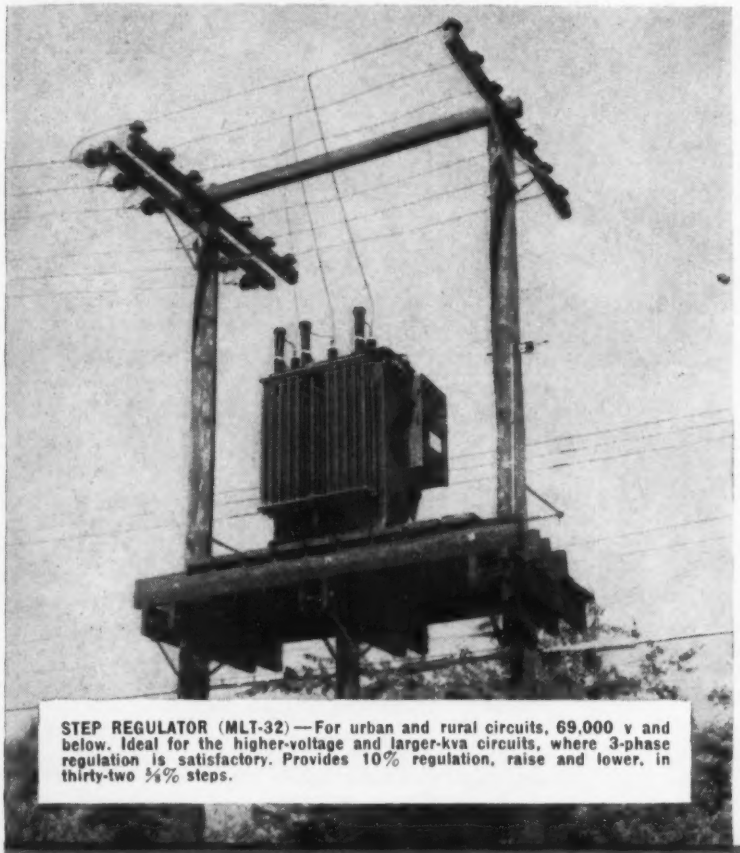
Investigation by the city attorney's office is continuing.

● WHEN an acute manpower shortage threatened to shut down one potline of the Troutdale aluminum plant in Oregon recently, some 35 employees of the Bonneville Power Administration volunteered for temporary work so that the plant could continue to operate. They were used as laborers in cleaning and relining aluminum pots until a civic recruitment program could be undertaken to supply the necessary permanent workers.

● CENTRAL LINCOLN COUNTY People's Utility District became the largest in the state of Oregon, as the result of recent voting in which measures to annex western parts of Lincoln, Douglas, Lane and Coos counties were passed overwhelmingly. Voters of Reedsport and Toledo turned down joining the Lincoln PUD. Each district held its own election.

● AFL BROTHERHOOD OF ELECTRICAL WORKERS has been certified by the National Labor Relations Board as collective bargaining representative of office and clerical employees of the Pacific Gas and Electric Co.'s Coast Valleys division.

# *Meet the family* of G-E regulators that are helping to find hidden kw



**STEP REGULATOR (MLT-32)**—For urban and rural circuits, 69,000 v and below. Ideal for the higher-voltage and larger-kva circuits, where 3-phase regulation is satisfactory. Provides 10% regulation, raise and lower, in thirty-two ⅝% steps.

**TYPE MLT-32, THREE-PHASE, 60 CYCLES**

| 2400 V | 4160 V | 4800 V | 7200 V | 12,000 V |
|---|---|---|---|---|
| 125 kva | 144 kva | 83.2 kva | 62.4 kva | 104 kva |
| 150 | 180 | 125 | 125 | 156 |
| 200 | 216 | 166 | 200 | 208 |
| 250 | 250 | 250 | 250 | 250 |
| 300 | 300 | 300 | 300 | 300 |
| 375 | 375 | 375 | 375 | 375 |
| 500 | 500 | 500 | 500 | 500 |
| 600 | 600 | 600 | 600 | 600 |
| 750 | 750 | 750 | 750 | 750 |

| 13,800 V | 23,000 V | 34,500 V | 46,000 V | 69,000 V |
|---|---|---|---|---|
| 120 | 200 | 200 | 200 | 200 |
| 179 | 250 | 250 | 250 | 250 |
| 239 | 300 | 300 | 300 | 300 |
| 300 | 375 | 375 | 375 | 375 |
| 375 | 500 | 500 | 500 | 500 |
| 500 | 600 | 600 | 600 | 600 |
| 600 | 750 | 750 | 750 | 750 |
| 750 | | | | |

**TYPE IRS, SINGLE-PHASE, 60 CYCLES**

| 2400 V | 4800 V | 6900 V |
|---|---|---|
| 12 | 12 | 17.3 |
| 24 | 24 | 34.5 |
| 36 | 36 | 69 |
| 48 | 48 | |
| 60 | 60 | |
| 72 | 72 | |
| 96 | 96 | |
| 120 | 120 | |

**TYPE ML-4, SINGLE-PHASE, 60 CYCLES**

| 2400 V | 4800 V | 6900 V |
|---|---|---|
| 12 | 12 | 8.6 |
| 24 | 24 | 17.3 |
| | 48 | 34.5 |
| | | 51.8 |

**TYPE AIRS, SINGLE-PHASE, 60 CYCLES**

| Automatic | | | | Hand operated | Motor operated |
|---|---|---|---|---|---|
| 120 V | 240 V | 480 V | 600 V | 120/240 V | 120/240 V |
| 1.2 | 1.2 | 1.2 | 1.5 | 1.2 | 1.2 |
| 2.4 | 2.4 | 2.4 | 3 | 2.4 | 2.4 |
| 3.6 | 3.6 | 4.8 | 6 | 4.2 | 4.2 |
| 6 | 6 | 7.2 | 9 | 6 | 6 |
| 9 | 9 | 9.6 | 12 | 12 | 12 |
| 12 | 12 | 12.0 | | | |

**INDUCTION REGULATOR (IRS)**—Ideal for severe operating conditions, such as 2400- and 4800-v city feeders. Provides 10% regulation, raise and lower. Available with either oil or Pyranol. On sizes 12 and 24 kva, cross-arm mounting feature is optional.

**BRANCH STEP REGULATOR (ML-4)**—For automatic regulation on branch and rural circuits where more expense is not justified. Provides 10% regulation, raise or lower, in four 2½% steps.

**AIR-COOLED REGULATORS (AIRS)**—For secondary distribution circuits, such as factory or office-lighting circuits. A convenient source of variable voltage for testing or laboratory use. The *automatic* regulator provides 10% regulation, raise and lower: the *hand-operated* unit, 100% raise and lower.

● These are the G-E voltage regulators that are keeping the voltage up for war production, often taking the place of new feeders. They are helping power companies make more effective use of the equipment on their systems. They make additional capacity available for new loads with huge savings in time, money, and critical material. Ask your G-E representative to evaluate the benefits of G-E regulators on your system.

GENERAL ELECTRIC

General Electric Company, Sec. C404-34,
Schenectady 5, N. Y.

*Yes* please send me detail information on the following voltage regulators:

- ☐ Type MLT-32 (GEA-1577)
- ☐ Type IRS, 12 and 24 kva (GEA-2018)
- ☐ Type IRS, 36 kva and above (GEA-2985)
- ☐ Type ML-4 (GEA-2038)
- ☐ Type AIRS (GEA-3057)

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CINCINNATI, OHIO


## B. C. WILL MAP POWER RESOURCES IN NORTH

Installation of 15 or 20 gauging stations on Northern British Columbia and Yukon Territory rivers this summer will be the first step in mapping the huge power resources of the area which borders the Alaska Highway, C. E. Webb, district chief engineer of the Water and Power Bureau of the Department of Mines and Resources, announces.

"Up until the present time, there has never been any accurate measurement of the flow of rivers in Northern B. C. and Yukon," said Webb.

"We estimate, however, that there are large blocks of hydroelectric power there such as could be used for electrochemical works, pulp or paper enterprises, or mining and smelting projects.

"I am merely suggesting these uses. Actually, it is the duty of this bureau only to find the water power, not to find its uses."

An excellent site for a high dam, suggests Webb, would be on the Peace River below Finlay Forks.

This would flood a 650-square mile area, providing 1,000,000 hp.

The grand canyon of the Liard River would provide a second great source of power. The Stikine River contains rapids which could also be harnessed to advantage.

● DEMONSTRATING that the "longest way round is the shortest way" at least on some occasions, a transformer from the Grand Coulee plant which was consigned to the Shasta Dam project in California traveled a total of more than 5,000 miles instead of 1,000. The circuitous route was occasioned by the size of the unit—it was too high to negotiate some of the bridges and tunnels on the shorter route. The final route was Grand Coulee-Minneapolis-Chicago-Kansas City-Bakersfield-Shasta Dam.

● POCKET-SIZE BULLETINS numbering 20,000 copies containing suggestions for the safe moving of hay derricks were mailed in May to rural customers of the Idaho Power Co. This will be supplemented by radio and newspaper publicity aimed at reducing accidents from derricks being hauled into power lines.

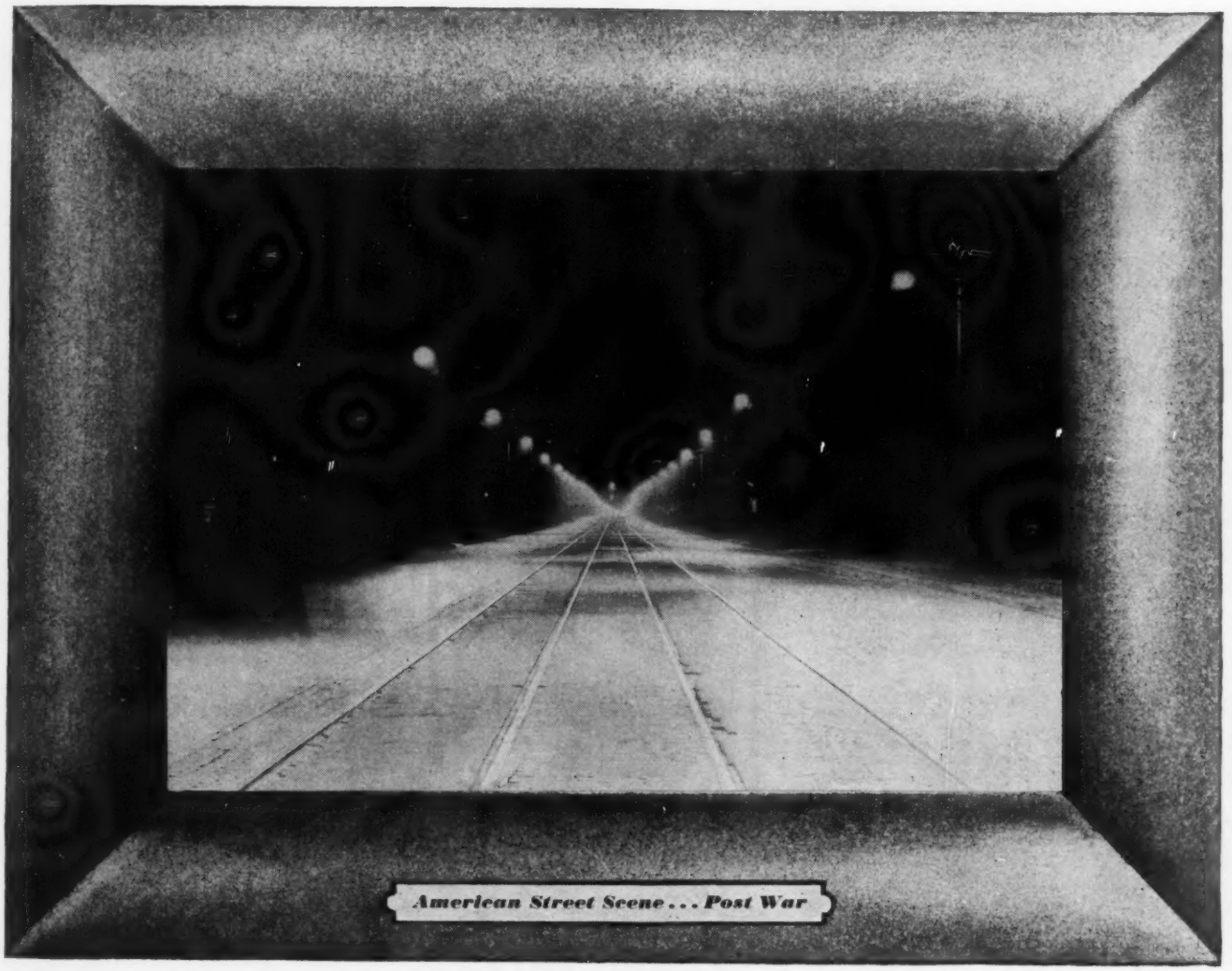
● APPEARING TO END their five-month rate dispute, a restraining order which kept Portland General Electric Co. from collaborating with Oregon state public utilities commissioner, George H. Flagg, after he had ordered rates reduced was suspended recently by Federal Judge J. A. Fee.

Replacement each week of nearly 400 burned out light globes in the 8½ miles of tunnel inside Grand Coulee Dam is facilitated by this man-sized tricycle. About 2,800 lights burn continuously

● FOLLOWING APPROVAL of the wage adjustment board in Washington, electrical workers in San Diego, Calif., have been awarded a wage increase from $1.50 to $1.70 an hour by the War Labor Board. The new wage scale, affecting 500 workers, was made retroactive to May 4, it was announced by the electrical workers business agent. The new pay rate puts workers on non-federal building construction or repairs on the same scale as federal electrical workers, whose wages were boosted March 10.

● THE COMING European invasion caused employees of the San Diego Gas & Electric Co. to vote to accept under protest a War Labor Board directive fixing wages under increases asked by nearly 800 electrical workers. The directive upped pay of laborers to 80 cents an hour, affecting about 65 employees, but refused an 8% blanket raise to remaining employees.

● ALLIS-CHALMERS Mfg. Co. has released a new 16 mm educational film on steam turbine operation. Titled *The Surface Condenser*, the movie is a sequel to *The Magic of Steam*.




# Plan STREET LIGHTING Now . . .

## *For Safe, Peace-Time Traffic . . .*

**To be efficient, Street Lighting must be planned . . .** The details of traffic flow, unusual or hazardous sections, expected changes in future traveling methods —all must receive careful study . . . And after proper analysis the complete plan for your locality and individual conditions should be made by competent authorities.

**Holophane Engineers offer you their aid**—and the knowledge acquired from years of concentrated experience . . . They will tell you about the new light patterns, new methods and will make recommendations that will assure the most satisfactory street illumination for your community. Their services are available without charge . . . Write for engineering data.

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**Distributors, General Electric Supply Corp.**

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**CUSTOM BUILT SWITCHBOARDS**

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If we or our Resident Engineer nearest you can be of assistance, please call on us. And let us send you our new booklet which describes the latest developments in Stage Switchboard design.

**HUB ELECTRIC CORPORATION**

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***HUB-REGULITE stage switchboard at Norfolk Naval Hospital, Portsmouth, Va. Pilot control station and remote switchboard are illustrated.***


## STATEMENTS REQUIRED OF UTILITY BUSINESS

Electric utilities which did more than $500,000 worth of business in any fiscal year were required to file a statement of such business with the War Contracts Price Adjustment Board on June 1 as part of a general renegotiation study. Also required to report by June 1, under the latest revenue act which provides for statutory renegotiation, were utilities which did more than $100,000 worth of business with any or all of six government agencies during a fiscal year ended before last June 30.

The six agencies are the War, Navy and Treasury departments, the Maritime Commission, War Shipping Administration and the Reconstruction Finance Corp. Included in the RFC are four of its subsidiaries, the Defense Plant Corp., Defense Supplies Corp., Metals Reserve Co. and Rubber Reserve Co.

## Edison Completes New Distribution Station

A new Southern California Edison Co. distribution substation to make more power available for increased agricultural load in the Delano district of the San Joaquin Valley was completed the forepart of May.

The new station is tapped off the company's Vestal-Delano 66-kv. line by a new line about six-and-a-half miles long. It has three 2,000-kva. transformers and three 11-kv. circuits. It is of wood pole and crossarm type of construction to save critical materials. Occupying a space about 100 x 100 feet, it is enclosed by the customary chain link fence and is unattended.

## Vernon City Substation To Get Three New Units

Reflecting additions to war plants in the Vernon, Calif., industrial area, work is now in progress to increase the capacity of the Southern California Edison Co.'s Vernon City substation to 90,000 kva. Three new 10,000-kva. transformers are being installed to form a 30,000-kva. bank to augment two existing 30,000-kva. banks.

A four-feeder position outdoor rack structure is being constructed to provide increased feeder capacity into the area at 7.2 kv. The underground duct system from the plant to Santa Fe avenue is being extended to accommodate eight underground feeders, one of which is being installed at this time.


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**BUILT TO ORDER IN A HURRY!!**

When you are installing or re-arranging—and need a special transformer to exactly match your requirements—call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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Electric Sirens

**THE PAINE COMPANY**
Toggle Bolts—Expansion Anchors

**CANNON ELECTRIC—DEVELOPMENT CO.**
Hospital Signal Systems Motor Plugs—Receptacles

**TRICO FUSE MFG. CO.**
Fuses, Oilers, Clip Locks and Fuse Pullers

**KNOX PORCELAIN CORP.**
Electrical Porcelain

## EDISON GIVES PICTURE OF WARTIME OPERATIONS

At the annual meeting of stockholders of the Southern California Edison Co., held April 21 in Los Angeles, W. C. Mullendore, executive vice-president, gave stockholders a picture of wartime operations, in which increasing revenue due to war activities is more than offset by increasing costs, mainly taxes.

"All of the money received during four months of 1943 was required to pay our 1943 taxes," he stated. "This represents the returns from one-third of our total sales of kilowatt-hours.

"We are not unwilling to bear our full share of the cost of this war. Acceptance of heavy taxation is a patriotic duty during wartime. But analyses have shown that electric utilities and certain other utilities have been adversely affected by war taxes, in comparison with most other industries.

"Also, it is common knowledge that enormous sums of money are being expended by the government which have no relation to the war effort or any normal operation.

"We ask that the burden of taxes be equitably distributed, and the total burden be reduced by elimination of all non-essential governmental activities."

The Edison Co. is owned by 93,000 stockholders.

## REA Allots $234,000 to Western Projects

Last month's REA allotments to projects in the Far Western states totaled $234,000 and included the following:

San Luis Valley Rural Electrical Coop., Inc., Monte Vista, Colo., $200,000 for the construction of 33 miles of line and the re-phasing of 83 miles to serve 124 irrigation pumps.

Quinault Light Co., Quinault, Wash., $3,000 for farm connections.

Flowell Electric Assn., Inc., Fillmore, Utah, $31,000 for farm connections.

● A NEW organization for maintenance engineers in industry, in the Portland territory, was organized May 18. C. P. Merklin, of Norris, Beggs and Simpson, property managers, was named temporary chairman, and Ivan R. Hoskins of Hawley Pulp & Paper Co., Oregon City, temporary secretary. About sixty attended.

The group expects to meet in about a month to consider the adoption of a constitution and by-laws.


**TELEVISION!**

**Featuring the Proctor Never-Lift Iron . . . another Proctor *FIRST!***

Scene from "If Men Played Cards as Women Do," television adaptation of the George S. Kaufman playlet of the same name. Presented March 28, 1944, on the "Proctor Playhouse" program.

*COMING!*

**exciting post-war "firsts"**

Let your imagination fly high when you think about the improved products and merchandising help you'll get from Proctor after victory. A lot of brand new Proctor "firsts" are on the way!

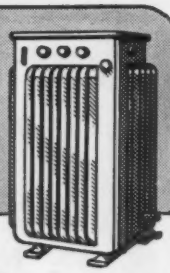
Buy War Bonds

**PROCTOR**

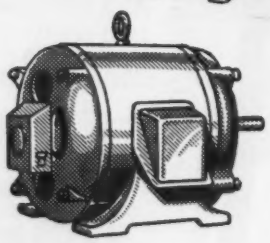
*NEWSMAKER* IN APPLIANCE MERCHANDISING

PROCTOR ELECTRIC COMPANY—*DIVISION*, PROCTOR & SCHWARTZ, INC., PHILADELPHIA 40, PA.

To Protect the Performance of Your Electrical Equipment—



USE Pedigree INSULATING VARNISHES



It's especially important to select the right electrical insulating varnish because it provides the protection that will add extra life to your electrical product. Good varnishes protect the quality of the parts they cover. Whether yours is a problem of water proofing, resistance to abrasion, oils, acids, alkalies, greater flexibility, or greater penetration, there is a Pedigree insulating varnish with qualities correctly balanced to give you the results you want.

The PRODUCT WITH A PEDIGREE — THE P.D. GEORGE CO.

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*Call In the Pedigree Varnish Man Nearest You.*

Quick servicing for electric ranges—
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The range unit that fits all electric ranges. Easy to install, cooks perfectly. Write

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THE PETERSON CO.: 1925 Blake St., Denver 2, Colo.

*Chromalox Super-Speed range units and parts available without priority — under WPB Order L-65.*

## WESTINGHOUSE BUYS RADIO STATION FROM OREGONIAN

Sale of the Portland *Oregonian's* radio station KEX to Westinghouse Radio Stations, Inc., was announced recently by Palmer Hoyt, publisher of the paper, and Walter Evans, vice-president of Westinghouse Radio Stations. Subject to the approval of the Federal Communications Commission, the disposition of KEX complies with the recent order of the FCC limiting ownership by a single operator to one standard broadcast station in a community. The *Oregonian* also owns and operates station KGW in Portland.

KEX, purchased for $400,000, is an affiliate of the Blue Network and transmits on a frequency of 1,190 kilocycles. Broadcasting since 1926, the station has been operated by the *Oregonian* for over twelve years. Lee B. Wailes, manager of Westinghouse Radio Stations, Inc., will direct KEX when the sale is approved.

## Railroad Seeks Permit to Install FM Radio System

Application for permission to install a frequency modulation radio system at Roper yards, near Salt Lake City, Utah, was filed with the Federal Communications Commission recently by the Denver & Rio Grande Western railroad.

Eliminating the need for messenger and arm signal communication, the radio system will permit communication between the control tower and switch engines operating in and near the yard, it was reported by W. W. Pulham, of Denver, superintendent of the railroad's communications. The installation will be one of the first of its kind in the West, said Pulham.

● MERGER of the Arizona Electric Power Corp. of Flagstaff and Winslow and the Arizona Power Corp. of Prescott into the Arizona Power Co. was approved recently by the state Corporation Commission. The merger must have SEC approval for which hearing was scheduled at Philadelphia late in May.

● BOTH the Mount Pleasant and Beaver City municipal systems were connected to the power network operated by the systems comprising the Utah War Emergency Power Assn., which includes the majority of utilities in that state. The facilities of the combined network are now available to the two formerly isolated systems.

## BC ELECTRIC ORGANIZES PERSONNEL DEPARTMENT

Organization of a personnel department has now been completed by the B. C. Electric Railway Co. at Vancouver. R. B. Middleton, assistant to the vice-president of the company, has been named manager of the new department. Middleton has been with the company for the past 16 years, and has been actively associated in employee activities. In addition to his new duties, he will continue in his present capacity as assistant to the vice-president.

J. Norman Robertson, who has been editor of company employee and safety publications for the past three years, has been appointed assistant to the personnel manager and has been transferred to this newly formed department from the publicity division of the company.

● TIME WAS when annual reports to stockholders were brief affairs with prosaic statistical reports of business done and of the company's financial condition. The *Report to Stockholders for 1943*, of Puget Sound Power & Light Co. reflects the new situation in which utilities find themselves. It devotes practically 36 of its 50 pages to discussing the economic, political, competitive situations in which the company finds itself. Ably presented and illustrated with some of the company's advertisements, the report is a forceful statement from President Frank McLaughlin, in which he lays all the cards on the table for the stockholders of the company. It has in it the drama of the struggle the company has been carrying on against a powerful public ownership campaign against it on many fronts. There is a ring of defiance through it from its cover slogan "Mobilize for Victory" to the last page tribute to the 500 members of the organization on the various fronts of the world "ready and willing to make the supreme sacrifice, that the things which have made America great may be preserved."

● ANNUAL REPORTS of utility companies of late years have become more and more pictorial but Utah Power & Light Co. in making its 1943 annual report has devoted it entirely to a factual summary of the vicissitudes which the company has suffered at the hands of rate hearings, the Federal Power Commission's evaluations, and the SEC order for refinancing. Likewise, a summary of additional power resources and an account of the Utah Light & Traction Co. is made in the statement of G. M. Gadsby, president. The book closes with a list of its 365 members in the armed services.


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BLACKBURN CONNECTORS *Reinforced* FOR STILL GREATER STRENGTH

Shown in circle is the *pressure bar* from a BLACKBURN CONNECTOR. Small arrows indicate how this bar is *reinforced* on both sides.

Actual tests prove that these reinforcements tremendously increase the bridging strength of the bar. Here's why — The connector nut can exert its pressure at only two points. But the bridge-like pressure bar distributes this pressure over the entire length of the connection. Like the tie rods on a bridge, the two reinforcements greatly strengthen the pressure bar, and give it maximum rigidity.

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**REINFORCING SLEEVES**

**for damaged points on Copperweld-copper conductors**

Nicopress Reinforcing Sleeves offer an ideal means of strengthening Copperweld-copper conductors at points where one or two of the copper wires have been damaged. These sleeves are split the full length and may be slipped over the damaged section and compressed with the same Nicopress Tool used in making the regular line splice.

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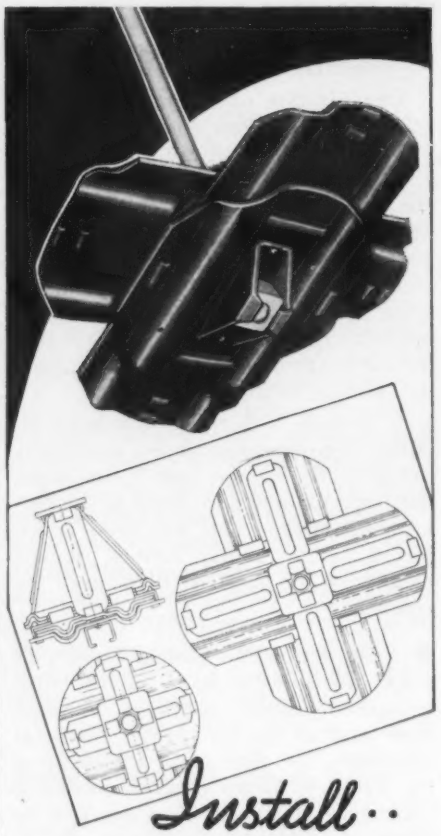
● MONTANA POWER CO.'s 1943 annual report is much more than the customary financial report of a utility company. More than half of it is devoted to the review of the assets and industries of Montana itself, indicating its position in agriculture, lumbering, oil and gas, manufacturing, mining, livestock and other developments. Containing topographical maps, history, excellent photographs of every phase of activity and recreation, it modestly presents the power company's data and its financial statement and the message of President and General Manager F. W. Bird at the end. The cover is a reproduction of a hitherto unpublished painting of the famous cowboy artist, Charlie Russell, which hangs in the Montana Club of Helena.

# PEOPLE
## *made this news*

### F. D. Weber, Electrical Inspector, Retires

Fred D. Weber retired May 15, closing a career in the electrical industry of 40 years, most of which was spent in inspection work. He had been chief electrical engineer for the Oregon Insurance Rating Bureau, Portland, since 1907. He had been secretary of the Northwest Section, International Association of Electrical Inspectors, since its inception in 1925; was one of the organizers of the Professional Engineers of Oregon and secretary-treasurer of that organization since its inception; was on the examining board of the state of Oregon for 20 years, resigning in 1940, and serving under four administrations.

A graduate of the University of California in 1904, he started as a salesman with Allis-Chalmers in 1906, left in the succeeding year to become chief electrical engineer for the Oregon Insurance Rating Bureau. In 1925 he and a group of inspectors in the Northwest region organized the Northwest Electrical Inspectors Assn. In 1927 a resolution favored an international association and in 1929 affiliation was made with the IAEI. Weber has been Northwest representative of the inspector group on the Electrical Committee of the National Fire Prevention Assn. He has been an associate stockholder of Underwriters' Laboratories, Inc.; a member of the Electrical Council of the Laboratories. Also,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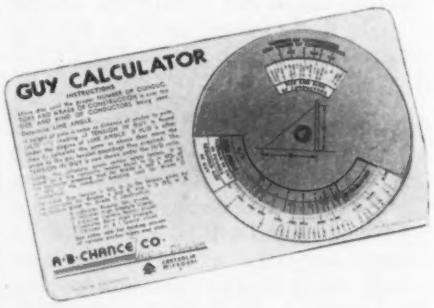


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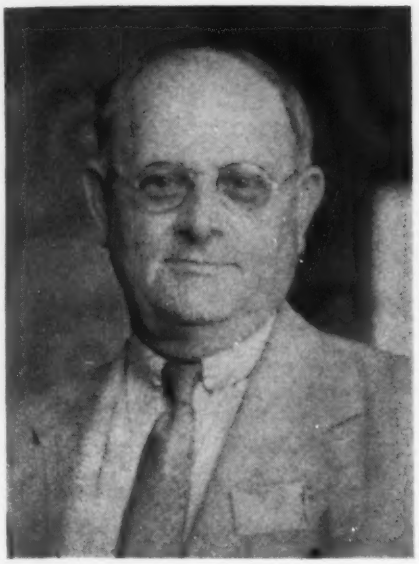

WEBER

he is a member of the American Institute of Electrical Engineers, the Portland Electric Club and was chairman of the Appeal Board for the city of Portland on the Fire Code.

He has sold his Portland home and moved to Beverly Hills, Calif. Before retiring he laid the plans for the forthcoming Northwestern Section, IAEI, annual meeting which will be held at Olympia, Wash., in August. No successor has been appointed to take his many association responsibilities.

## G. B. Rosenblatt Receives Westinghouse Merit Order

Girard B. Rosenblatt, Pacific Coast district manager of the industrial and marine divisions, Westinghouse Electric & Mfg. Co., has been awarded the Westinghouse "Order of Merit", highest honor for distinguished service to the company. Presentation will be made by B. W. Clark, vice-president in charge of sales, in June.

The award was voted by company directors to Rosenblatt "for his contributions toward improving the prestige of Westinghouse on the Pacific Coast; for his accurate analysis of commercial situations and his ability to utilize the resources of the organization in meeting them; and for the wide acceptance among industrial executives which his engineering and commercial abilities have brought to him."

● ERIC JOHNSTON recently became the first "third-term" president of the U. S. Chamber of Commerce. Johnston is president of the Spokane firms of Brown Johnston Co., retailers of electric goods, and the Columbia Mfg. Co., electrical manufacturers.

● EMERY D. SHERWIN, former general superintendent of the San Diego (Calif.) Gas & Electric Co., recently was elected a director and vice-president in charge of operations, succeeding H. R. Peckham, who died May 13. Sherwin was graduated with a bachelor of science in engineering from Stanford University in 1917.

● JOHN L. BUSEY, president, General Electric Supply Corp., and former West Coast executive of that company, was elected president of the National Electrical Wholesalers' Assn., at its recent Chicago meeting.


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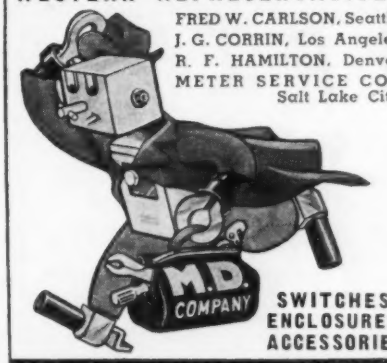


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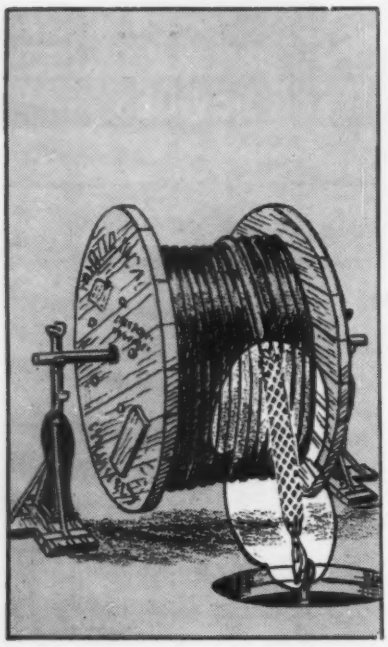

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## Westinghouse Promotes Pulsifer, Hutchinson

L. D. Pulsifer has been appointed appliance manager of the Westinghouse Supply Co.'s North Pacific district, with headquarters at Seattle. For the past two years he had been with Westinghouse Electric & Mfg. Co. at Portland, handling central station and industrial customers. Previously he had been district home appliance representative for Portland, Salt Lake City, San Francisco and Seattle.

A. T. Hutchinson, with the supply company at Seattle and Portland for 19 years, will go to Portland as application engineer for the manufacturing company.

● Frank Viller, maintenance engineer for the operating department, San Joaquin Power Division, Pacific Gas and Electric Co., Fresno, resigned recently to become Western division engineer with the Gould Storage Battery Co. He joined San Joaquin Power Corp. in December 1921 as relief operator. He is succeeded by D. W. Haire, who joined PG and E in 1934. He was previously electrical engineer at Pinedale.

● James A. Brown of the Westinghouse electric appliance division has been transferred to San Francisco as service supervisor for the Pacific Coast district. He replaces Eugene C. Watts, who has gone to East Springfield, Mass., as manager of special beverage cooler sales. Brown formerly was service supervisor of the appliance division at Mansfield, Ohio.

● Ruben Lagerstom, illuminating and electrical engineer of the General Electric Co. Lamp Department, for awhile in the Oakland division office of the company, has taken leave of absence to join the U. S. Navy as a civilian lighting expert, and passed through San Francisco on his way to Pearl Harbor.

● H. D. Moreland, former application and service engineer in the San Francisco and Portland offices of Westinghouse X-ray division, has gone to Baltimore, Md., as manager of the engineering department at the X-ray products plant.

● Carl Mak, sales supervisor in Pacific Gas and Electric Co. North Bay Division at San Rafael, has been transferred to Vallejo in charge of the Vallejo office.

● Robert P. Case, electrical contractor of Napa, has moved his place of business to 1732 Madison Ave., San Diego, Calif.

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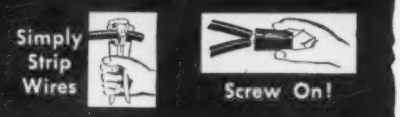


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● GILBERT BUCKNUM, who produced two color moving pictures for Public Service Co. of Colorado, one on its electric service, the other on its gas transmission lines and service, has become affiliated with the Visual Training Corp., of Detroit, as editorial and production director of its Denver office, associated with Arthur G. Rippey, Denver manager. Bucknum also did several still photographs which have been used by ELECTRICAL WEST as covers, the last of which was the November 1943 cover showing the erection of a wood pole power line at high altitude in the Colorado rockies.

## OBITUARY

### H. R. Peckham

Hildreth R. Peckham, vice-president in charge of operations, San Diego Gas and Electric Co., died last month at his home in San Diego.

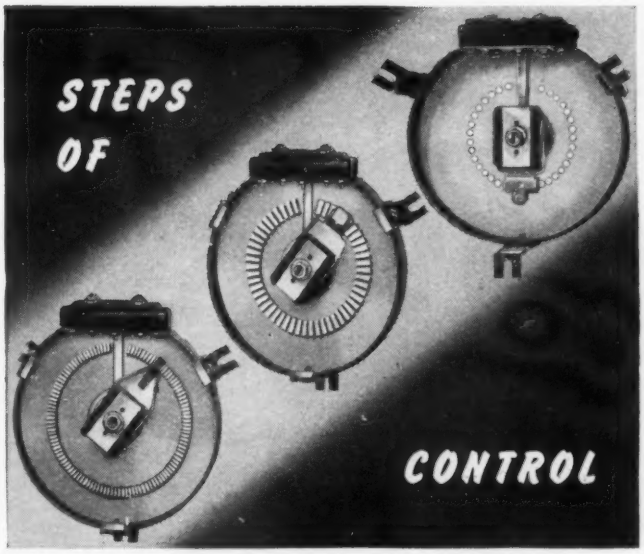
Born in St. Louis in 1887, Mr. Peckham moved with his family to San Diego in the early nineties. Following graduation from Princeton University, he began his career as civil engineer with the Pennsylvania Railroad.

He returned to San Diego in 1912 and joined the San Diego Gas & Electric, serving successively as engineer, department superintendent, general superintendent and vice-president. At the time of his death, he had charge of all construction work and the operation of the utility's gas and electric plants and distributing systems. He was active in the company's wartime expansion program.

Mr. Peckham had a distinguished army career in the first World War and attained the rank of Captain in the Engineer Corps. He saw hard fighting in the Argonne and other battles and later was with the Army of Occupation at Coblentz, Germany, and served with the American peace delegation in Paris.

● JAMES H. FLETCHER, president of the Musical Instrument and Electrical Appliance firm of Fletcher Bros. Ltd., Victoria, died recently.

● W. C. MCKENDRY, member of the Vancouver, B. C., office of Cochrane Stephenson Co. Ltd., wholesale electrical distributors, died at his home in Vancouver recently. Mr. McKendry was manager of the Vancouver office of Cochrane Stephenson for 17 years. Prior to coming to Vancouver, he was in Winnipeg with Cochrane Stephenson and previous to that he was employed by Northern Electric. During the last war Mr. McKendry went overseas with the Canadian Cyclist Corps.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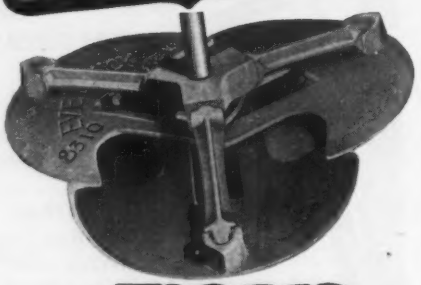

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# TRADE notes

● G. F. HAIN, for the past 20 years with Westinghouse Electric & Mfg. Co. at Seattle and Los Angeles, has become a partner in the Ray Murphy Co., manufacturers' representatives. With offices at 720 E. Second St., Los Angeles, the Ray Murphy Co. represents Crescent Insulated Wire & Cable Co., Spang-Chalfant and Steel City Electric Co. Hain formerly was Westinghouse manager at Seattle and later headed the lamp division at Los Angeles.

● CROSLEY CORP. announced appointment of new distributors in Oregon, Washington and Montana. The Arthur L. Fields Chevrolet Co., 107 S. E. Grand Ave., Portland, will handle the Oregon territory and the Commercial Appliance Co. Inc., at Ninth North and Denny Way, Seattle, is Washington representative. Great Falls Paper Co. of Great Falls is Montana distributor.

● HENRY A. SMITH (Electric Smith) has purchased the two-story brick building at E 121 Sprague Ave., Spokane, which has housed his plant for the past six years. The firm is engaged in electrical contracting and distribution, motor repair, line construction and recently has been doing a number of military installations.

● EMERSON RADIO and Phonograph Corp. has appointed Century Distributing Co., of Los Angeles as distributor for southern California. Located at 935 East Pico Blvd., Century is headed by Louis R. Swenson. Although new radios are not available, the company is stocking a complete line of parts and tubes and has established a centralized service station.

● CUNNINGHAM TRAPP, LTD., Westminster, B. C. has now permanently changed its name to Marshall-Wells, Ltd., according to announcement by J. F. McCullin, president of Marshall-Wells Canadian Companies, of Winnipeg, Manitoba. W. A. Thompson is the managing director of the Westminster firm. The company is in wholesale and retail hardware business, handling electrical appliances and supplies. Although the actual ownership in the firm was bought some 15 years ago by the Marshall-Wells Companies, no change in name has been made until now. The Marshall-Wells Companies also operate in the United States.

● RESIN INDUSTRIES has been formed at Santa Barbara to produce synthetic compounds of the thermoplastic type used in electric equipment, wire and cable and wiring systems. Grant C. Ehrlich is president.

The company will produce synthetic elastimers—including vinyl resin, ethyl cellulose and similar compounds—in tubing, tape, sheet and other forms. It also will offer these materials in combination with a variety of fabrics, both coated and impregnated.

● GROVER BURKE, Seattle electrical contractor, has purchased the stock and fixtures of Electrical Engineering Co., 110 Marion St., from James Maitland, who has handled the business since 1900. Burke will combine the business with that of City Electrical Co. The deal involves representation in the area of Landers, Frary & Clark on Universal electric appliances; Hamilton Beach & Co. and Silex.

● C. D. CUNNINGHAM is representing Guth Lighting Fixture Co. and the S & M Lamp Co. in the state of Washington, working under an agreement with Les Baxter, who handles these accounts in the Northwest. Cunningham formerly was salesman with the Globe Electric Co. in Seattle.

● CUTLER-HAMMER, INC. has announced new Portland quarters in the Security Bldg., 131 S. W. Fourth Ave. Increased sales in the Portland area are responsible for the move, according to the announcement. Frank J. Woldrich, sales engineer, is in charge of the office.

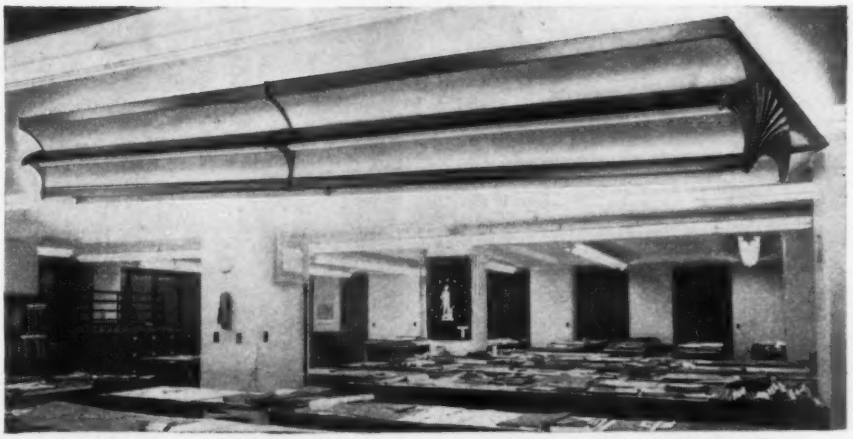
● UNITED STATES RUBBER CO. is building a $20,000 fully air-conditioned laboratory at its Los Angeles plant which is part of a general expansion program which, when completed, will double production capacity.

● SPRAGUE SPECIALTIES CO., North Adams, Mass., has changed its name to the Sprague Electric Co. The company makes condensers, resistors and power factor control equipment.

● APPOINTMENT of Listenwalter & Gough as Sylvania distributor in the Los Angeles area was announced last month at a dinner given by the wholesaler at the Biltmore Hotel.

● HOFFMAN RADIO CORP. has purchased the cabinet plant of the Belcher Co. Inc. of Los Angeles.

● ALLIS-CHALMERS MFG. CO. has opened new Portland offices at 706 Public Service Bldg.

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# PROFILES *of the month*

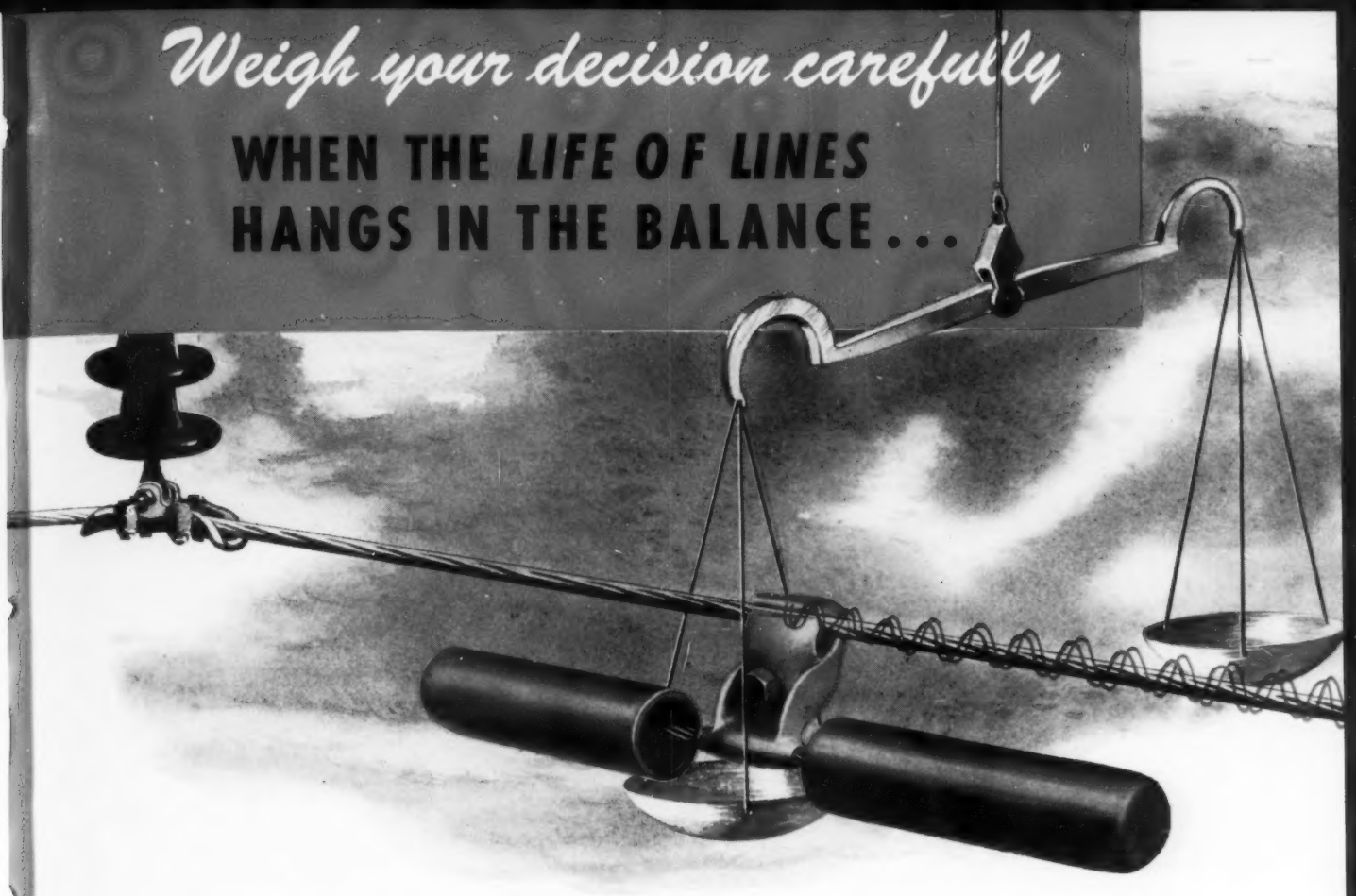
Postwar aspects of the Pacific Coast's wartime industrial development were shortwaved recently to China, Australia and The South Pacific. R. E. Fisher, PG and E vice-president and area chairman of the Committee for Economic Development, told the utilitie's place in the picture. Shown above are Robert C. Elliott, San Francisco "News"; Fisher; Robin Kinkaid, OWI and William Winter, commentator

H. L. Logan, Holophane Co., pictured, left, during his recent visit to the West Coast, where he gave a series of talks on brightness control in architectural and illumination design and on seeing

Shirtsleeved, A. O. Alderman, Bussman representative, Seattle, demonstrated the motor load starting qualities of the Type-S fuse to Montana inspectors at the recent annual meeting

*Weigh your decision carefully*

# WHEN THE *LIFE OF LINES* HANGS IN THE BALANCE...



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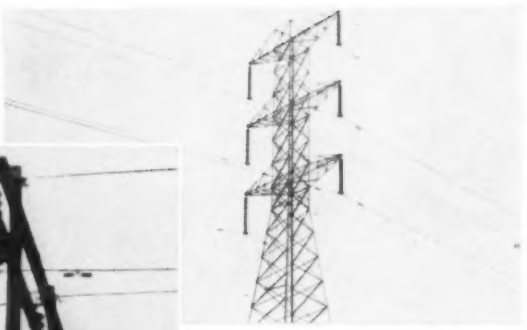
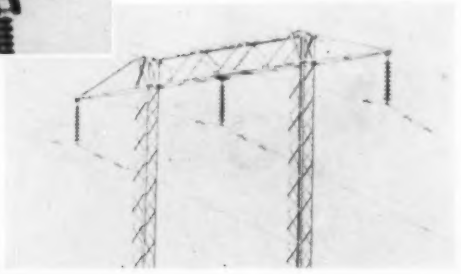
*PATENTED

Transmission line failures due to breakage of overhead conductors are caused by fatigue at the points of support. This fatigue is the outgrowth of resonant oscillations under the cumulative effect of undamped rhythmic forces. The energy of incipient vibration, therefore, must be arrested before it builds up to destructive amplitudes. The most effective and positive means of accomplishing this is with Stockbridge Dampers, which are especially designed, engineered and thoroughly proved for this specific service. By every standard of comparison the Stockbridge Damper is best suited for new construction as well as on existing lines. It can be readily mounted in less time and flexibly adjusted to prevailing conditions. Moreover, it is easily installed with hot line tools without disturbing suspension or dead end clamps. To be sure of economical and lasting protection—be sure to specify Stockbridge Dampers.



*Views show various types of construction employing Stockbridge Dampers.*

*For further details call your nearest branch of Graybar Electric Company or General Electric Supply Corporation*



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# Don't let it die out!

Think of the investment in Red Seal Adequate Wiring, the innumerable columns of advertising and publicity, the thousands of man-hours of promotional writing, speaking, consulting with architects and builders, selling people in and out of the industry on the comfort and convenience and dollars-and-cents value of wiring tailored to fit the home.

*This is an investment worth protecting!* Even though private building is out for the duration, we must not lose the momentum built up during eighteen years of almost continuous promotion. Ways must be found to bring in Red Seal wiring *whenever* we discuss the vision of a post-war Electrical Age.

This applies not only to our advertising but to our everyday conversations with neighbors and friends. Tomorrow *everyone* will be thinking of a new home!

PACIFIC COAST *Electrical* ASSOCIATION

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